An Investigation into the Market for Initial Public Offerings of Shares in the United Kingdom.

by

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Abstract

This thesis takes as its subject the market for Initial Public Offerings (IPOs) of equity securities in the United Kingdom. The principal aim of the study is to try to find an explanation for why investments in IPOs in the UK provide an average excess return to investors.

Once levels of excess returns have been identified this study seeks to offer 'stabilisation' as an intuitively appealing, theoretically sound and practically evidenced explanation of excess returns in the UK IPO market.

This thesis then goes on to look at the UK IPO market in more detail, paying particular attention to the roles played by sponsoring agents involved in the IPO process and what impact they have, if any, on differential levels of excess returns between IPOs. The economic efficiency of the IPO market is also addressed at this point.

The final piece of research in this thesis examines the subject of management buyout flotations. The aim here is to provide evidence to support the claim forwarded that management buyout flotations produce superior performance to the universe of IPOs as a whole.

The data set used for this thesis is made up all flotations undertaken in the United Kingdom in the period from 1989 to 1995.

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Introduction

This thesis concerns itself with the market for initial public offerings (IPOs) of shares in the United Kingdom. The principal aim at the outset of the project was to try to provide an explanation as to why initial public offerings conducted in the United Kingdom appear to produce an average excess return in the order of 10% in the immediate aftermarket. Evidence to support this statement has been provided by a number of researchers with Merrit, Howe and Newbould undertaking the first extensive UK study in 1967.

Obviously, the fact that evidence to attest to this proposition exists in the UK, and indeed in many other countries, goes in the face of one of the principal tenets of the Modern Theory of Finance, namely that an investor should not be able to make a profit by following a trading rule. The evidence presented from all studies carried out to date repudiates this proposition.

This thesis is organised into eight principal chapters of which the final three contain the principal research work. In addition to this brief introduction which is intended to set the scene for the rest of the work, there is a concluding piece that draws together the findings.

The first four chapters of the thesis are concerned with introducing the vast and complex subject of initial public offerings. The IPO process is introduced in some detail along with a number of features salient to it. These include the roles of the players involved in the flotation and the costs both indirect and direct of obtaining a listing. The difficult and complex issues of pricing and valuation are also discussed at some length. A significant amount of time is taken in familiarising the reader with the dynamics of the market as it is most important that the results presented later in this thesis can be placed firmly in context in what is a complicated market.

Chapter five contains the literature review. This is also a lengthy piece, purely a function of the complexity of the issues and the sheer volume of the work written on the subject. The major theories are introduced and discussed in this chapter. In broad overview there are arguably half a dozen main theories advanced to explain the anomaly of IPO excess returns. Each is discussed at some length. A number of the theories are based on informational asymmetries between agents in the market for IPOs.

The principal fundamental research undertaken in this thesis is conducted in three parts. The work follows the theme of attempting to reconcile the observed phenomenon with the data at hand while also expanding the work into different, but related, areas of research.

To that end the first research chapter, chapter six, introduces evidence on a particular explanation for observed excess returns. This explanation, which involves manipulating actions by stockbrokers termed 'stabilisation', has not been investigated to any great degree in the United Kingdom although some work has been undertaken in the USA. This explanation reconciles the excess returns in the context of a 'fair game'. In that sense this explanation is broadly in agreement with the principals of the Modern Theory of Finance.
Evidence is presented in this chapter to show that this explanation would indeed appear to be valid in a UK context.

Chapter seven contains the results of research on 'signalling'. The notion here is that potential IPOs attempt to show the underlying quality of the businesses through appointing advisors of a high quality. By so doing they hope to signal superior quality and hence reduce risk and levels of excess return in the aftermarket. This research moves on a step from the work conducted in chapter six where the results indicate that the excess returns in the UK may be more of a statistical artefact than a function of a market failure. The notion of the research here is to identify whether, among the universe of IPOs where we believe underpricing to be caused by 'stabilising' activities, there are differential levels of excess returns as potential IPO

companies attempt to 'signal' their quality to potential outside investors (and hence reduce the 'indirect' costs of underpricing and consequently the excess returns).
In this instance this theory is not supported for the data used. 'Signalling' does not appear to have a differential impact on levels of excess returns in the manner suggested by the 'signalling' literature.
This chapter then goes on to address the issue of costs of flotation, and in particular indirect costs. The purpose of this adjunct to the study is to determine if 'smaller' flotations derive value for money through the appointment of 'high quality' advising agents. This is found not to be the case. Small flotations appear to incur unnecessary costs via the use of expensive investment banks.

Chapter eight moves on from chapter seven and examines the phenomena of venture capital backed flotations. The rationale behind this research is to investigate the topic of venture capital backed flotations to identify whether the 'due diligence' undertaken by venture capitalists in their pre-investment evaluation process, and their subsequent decision to invest, acts as a signal of 'quality' to potential new investors when the underlying company attempts to achieve a listing on the Stockmaket.
After introducing the subject of venture capital, what exactly is meant by it and recent trends in the UK, the main empirical work attempts to test for the 'signalling' effect of a venture capitalist on a corporate flotation. The evidence points to venture capital backed flotations performing better that the universe of IPOs in the medium term. This study attempts to determine whether any differential effect can be detected in the immediate aftermarket returns. No such effect is found.

Finally, this thesis concludes with a brief piece drawing together all the work undertaken in its constituent chapters.
The findings of this thesis can be very briefly summarised as follows. Firstly, evidence is presented to point to the existence of 'stabilisation' in the UK IPO market. This may account for the average excess returns found. The further work undertaken points to 'signalling' via the appointment of highly reputable agents not

helping to reduce levels of excess returns. In addition, it is found that smaller IPOs incur additional costs through their use of highly reputable sponsors.
The final result relates to the work undertaken into the market for venture capital backed flotations. The aim of this piece of research was to determine whether venture capital backed floats produced superior share price performance in the immediate aftermarket. No such evidence was found.

The UK IPO market is dynamic. Consequently, a number of features relating to the market have changed over the time that this thesis covers. While this does not fundamentally alter the results, the reader should bear in mind that certain elements of the marketplace have changed over the passing of time. The main changes are outlined for the reader throughout the thesis.

I should like to take this opportunity to thank the great many individuals who have assisted me over the years in this project. Firstly, I extend my warmest thanks to Professor Andrew McCosh and Dr. Peter Moles of Edinburgh University without who's support and backing this project would not have been a success. Mr Andrew Adams and Dr. Seth Armitage also provided valuable help and encouragement.
I also owe a great deal of gratitude to the institutions who have both employed me over the course of this project and have sponsored the research. I am particularly grateful to Mr Gordon Anderson and Mr Neil Pirie of CastleInternational Asset Management who provided the initial support for the project and to Mr Mike Balfour and Mr Alistair Currie of Edinburgh Fund Managers p.l.c. who continued this support in a way that I regard myself very lucky to have enjoyed.
The many others who have suffered with me over the course of this project are too many to mention by name. I thank you all for your support and for your inspiration.

Finally, I certify that this work is my own and that all errors of commission or omission relate to me alone.

Chapter One

1.1 Introduction

When a company grows beyond a certain size it will have to look further than its founding members for additional finance. A common method of obtaining this financing is for the company to 'Go Public' and seek a listing on the London Stock Exchange. This process is a complicated and drawn out one and not one which is taken lightly by those companies who embark on it. The whole process from instigation to completion may take two years or more.

A fundamental part of the flotation process involves determining the suitability of the potential IPO candidate to move into the quoted arena. The criteria that such organisations ought to have are discussed in this chapter.

Once the decision on the suitability of the company has been made, the complex and time consuming process of attaining a listing can begin.

Hopefully, this chapter will introduce the reader to some of the fundamentals of the UK IPO market so that when the fundamental research chapters are reached, the reader can place the results firmly in context.

1.2 Motivations for Going Public

1.2.1 Divestments

There are essentially two types of new issue. They are either individual growth companies or divestments of sub-units out of larger groups. Such divestments may be floated immediately on exit from the group, such as Zeneca was from ICI, or there may be a management buyout from the parent (backed by venture capitalists) which leads to a new issue some two to three years later. Companies have their own reasons for divesting subsidiaries but in general recent thinking is that non-core activities which don't meet pre-determined objectives should be disposed off. For instance in August 1994 the small engineering company Wellman bought a package of non-core engineering businesses from mini-conglomerate FKI.

The reason FKI decided to divest of certain units was that these businesses did not meet the organisational objectives of group senior management in that they could not meet the 10% return on sales criterion that the group management had set for all of its businesses. In such circumstances selling the business to the management via an MBO[1] who will then sell it onto the market normally two to three years later is preferred to a trade sale where the endeavours of the incumbent management get passed directly to the competition.

KPMG Corporate Finance give the following reasons why a company may divest a part of its business[2]

- It no longer wishes to devote resources to peripheral operations.
- It has assets which can be sold to release capital for other more attractive projects or to reduce capital.
- Statutory or Regulatory change prevents the business continuing in its current form.
- It is compelled by poor core business performance to sell profitable subsidiaries to reconstruct its balance sheet.
- It lacks the resources to realise the growth potential of the non-core businesses.
- There is no succession in a family company.

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[1] Or indeed via an MBI

[2] KPMG New Issues Quarterly Jan-Mar 1992 p7

- There are differences in opinion among the management which is causing inefficiency.

1.2.2 Small Growth Companies

There are essentially two kinds of small company which might contemplate a float. There are the small fast growing companies who need the additional equity finance to fund expansion and there are the small, low growth 'stagnant' companies who need funding to finance capital replacement. Only the former really ever trouble the market as the slow growth 'stagnant' sort rarely engender enough enthusiasm to float successfully.

Going public is an avenue that nearly all small growing companies must go down at some stage. The faster they grow the sooner this step is likely to be taken. A time will be reached when previous sources of finance become unavailable to growing enterprises. The owners own capital will be exhausted and the banks, who like to lend against an asset base, will not be willing to lend[3]. It is at this stage that the company will have to bridge the 'small company financing gap'[4] and progress, possibly by the involvement of a venture capitalist or a 'business angel'. Essentially a company can grow to a certain point with the backing of the banks and the injection of capital from the owners. Beyond this point (which is not finite but varies from business to business dependent on a number of factors) further growth may be financed by a number of methods.

Venture/Development capital is a route commonly followed by more substantial enterprises and may be provided from a number of sources such as the recently privatised 3i. In this arrangement the venture capital provides finance in return for an equity stake in the organisation (which will be liquidated at a later date, possibly when the company gains a Stock Exchange listing).

A recent trend which is most worrying is that the venture capital industry is changing in that there is less and less 'seed corn' capital available. This means that smaller

[3] Banks often use 'collateral ratios' when making lending decisions and like to see a profitable track record.

[4] As outlined in the MacMillan, Wilson and Boulton Committees of 1931, 1981 and 1971 respectively

organisations seeking funding need to find this funding through contacting relatively scarce 'business angels'. More and more funds are being concentrating in what is known as the 'development capital' end of the spectrum due in no small part to the more favourable risk/reward ratio. At this end the lendee is a more advanced business which requires additional funding for expansion as opposed to funding for start up. In 1989 only 7% by value of venture capital investment was made at the 'seed corn' level versus 27% in 1984[5]. Other methods of obtaining finance exist. Perhaps the most common of these was until recently the Business Expansion Scheme[6] where by investors could inject capital into small businesses and obtain a tax benefit from so doing. However, there remains a problem in financing small businesses. This small company financing gap has been recognised for many years by at least three government committees and yet it still remains. However, after a point in the development of the business there is no alternative to seeking a listing to raise further funding. A listing provides a means of widening the ownership of the company and allows access to a large pool of long term risk capital (which it is not the task of the banks to provide) as well as providing an exit route for parties to a venture capital transaction or the parent company of a group. Equity capital can provide long term financial stability while reducing reliance on riskier debt based finance.

[5] 'New Issue Overload', p17, published by James Capel Ltd, London 1995
[6] The scheme stopped on 31/12/93

1.3 Suitability for Flotation

Perhaps the most significant step a company takes on the way to attaining a listing is to publish a prospectus. If a company is applying for a listing the prospectus becomes known as the 'listing particulars' and is then subject to Stock Exchange regulation. This document lays down what the company intends to use the proceeds of the flotation for and, among other things, that the directors are responsible to shareholders for mis-statements in the document. A private company is prohibited from issuing a prospectus to the public under the terms of s170 of the Financial Services Act 1986. It follows that all listed companies are public companies but not all public companies are listed. (e.g., Virgin) In essence then there are a number of statutory and quasi statutory terms and conditions which much be met before a company can attain a listing. These are easy to interpret as they are written in legalistic form. However, in addition to this there are a number of qualitative criteria which a company must go some if not all the way to fulfilling if the prospective issue is to be a success. Satisfying the Exchange's requirements does not mean that a company is suitable for flotation. In the end the company will have to convince the investment community of the quality of its business and its prospects. Perhaps most important of all the company must be able to meet the expectations of it which the market may come to hold. To that end there are a number of factors that the prospective new issue's management and its advisors must be aware of.

Management

The management of the business must be sound, experienced and offer sufficient depth of experience and knowledge of the business concerned to allow potential investors to put their trust in them. As far as the success of the issue is concerned it would seem anecdotally that there are three types of management. Type 2 management, the most prevalent, have solid backgrounds. They are well qualified, have suitable experience and have run the business successfully enough to get it in a position where a float can be contemplated. The presence of this type of management is not a major concern in determining the success of the float. Types 1 and 3 management do make a difference. Type 1 management are the 'white knights'. Such management have excellent track records of providing high returns and as such their existence acts as a plus factor to the perception of the success of the issue[7]. Type 3 management could be characterised as having 'skeletons in the cupboard'. The existence of this type of management acts to the detriment of the success of the issue. If management have run the business into trouble in the past investors will not be inclined to back them to do likewise with their money. As well as the abilities and history of the individuals there must also be a management structure in place which provides for the proper running of the firm in the best interests of the prospective shareholders. Perhaps the classic example of the failure of this is Rolls Royce. In the early seventies the lack of proper financial management at board level and the consequent bias towards technological development in the face of business risks saw the company in severe financial trouble. In the light of this and subsequent cases and in the wake of the recommendations of the Cadbury Committee on Corporate Governance which reported in 1993, investors like to see the separation of the roles of executive Chairman and Chief Executive as well as the existence of such bodies as the Audit Committee and the Remuneration Committee. These bodies should be staffed by a majority of Non Executive directors. The potential role of the Non Executive directors is discussed in Cadbury and the City group Pro Ned produces guidelines for the appointment and responsibilities of the Non Executives. The board need to understand and fully accept their responsibilities as directors of a public company, the demands these responsibilities may place on their time and that their freedom of action may have to be curtailed by the need to satisfy the needs of shareholders. This factor may be particularly pertinent where a small privately run company is taken public by its founders and majority shareholders as management. This is often the case and management in this scenario anecdotally have the hardest time adapting to the rigors of managing the business for the shareholders and not for themselves.

Track Record

[7] An example of this phenomena is the management of Pillar Properties Ltd who came to the market in August 1994

Before a listing can be contemplated the organisation must have a track record which potential investors can examine before committing funds. In particular, the abilities of the management to grow the earnings and dividends of the business will be critical. At the time of writing the market was looking for around 12-15% earnings growth per annum. If the management have not grown the business at such levels in the past investors will want to know why. There may have been constraining factors such as a lack of capital committed by a parent company which will be eliminated by the float. If not investors may require a lower level of earnings growth to be compensated for by a higher level of dividend. In recent years the track record requirements imposed by the Stock Exchange have been reduced and brought into line with those of the European Community. Investors like to see a record of consistent and increasing profitability over a period. Inconsistent performance which cannot be explained by extenuating factors will dissuade potential investors from participating.

Business Outlook

The general factors affecting the business and its market sector must appear favourable to investors and will effect the timing of the flotation. If there is sudden news which effects the business directly then the issue will be delayed if not permanently abandoned. This is fairly rare as the sponsor to the issue normally spends long enough in due diligence that there is little chance of such a potential outcome being overlooked. What is more likely is that the market / market sector becomes less attractive. In the latter part of February 1994 the market corrected quite strongly after a period of strong outperformance. This caused a number of potential new issues to be delayed. This may mean that certain macroeconomic factors have a significant impact on the likely success of an individual issue. For instance at the time of writing the performance of property companies coming to the market was somewhat constrained by the performance of the UK gilt market. This was due to the fact that there is a considerable amount of historic correlation between the level of gilt yields and the yield on property portfolios. At the time of writing it didn't appear that gilt yields were going to move sufficiently to facilitate a move forward in the value of property company shares. As such property company new issues were somewhat constrained. Similarly there may be certain industry specific factors which would stop a new issue being a success. At the time of writing the food retailing sector was out of favour as the market polarised into quality and discount operators. As incumbents fought for market share there was considerable pricing pressure. It is therefore unsurprising that there were no new issues into this sector in the period.

In general investors will look for a stable and well diversified business with good growth prospects and will look to the micro and macro economic factors in the economy at the time of the float to facilitate the realisation of potential.

Operating Structure

If the organisation is organised in a complex manner some element of rationalisation may be required before a flotation can be contemplated. If the structure makes the business to complex too understand for potential investors then some form of rationalisation should take place. A recent example of how a complex operation acted against the chances of success of a class of companies can be found in the Biotechnology sector. Recent years have seen a number of new issues from bio-technology companies. These are often small organisations, often spin-offs from various Universities, which specialise in developing new drugs to treat diseases such as cancer. The technology involved is complex and difficult to understand. The combination of the technology which is difficult to understand and the risk of investing in such a cash intensive industry put many institutions off investing. Perhaps the sponsors to the issues did all that was possible by circulating easy to understand guides to the companies? However, even they proved difficult to deal with. To a certain extent such a problem as was felt by those companies is difficult to deal with. What is somewhat easier to cope with is the situation where the company is simple to understand but is just badly run with an inappropriate organisational structure. This is far easier to rectify and many new issues make a point of re-organising their management structures to cope with the organisational strain of having a listing.

Conflicts of Interest

Potential applicants for admission to listing must be aware of the consequences of substantial relationships with shareholders. If the company has a relationship with a shareholder who has 30% or more of the voting capital or who is in a position to control the composition of the Board which could result in a conflict of interest with its responsibilities to the general body of shareholders it may be considered unsuitable for flotation. This kind of potential problem can be discussed with the exchange.

Financing and Financial Controls

Any company intending to enter the market must ensure that it has a strongly capitalised balance sheet and enough working capital to meet its current and projected needs. This can sometimes be problematical as organisations which make disposals pre flotation have to come to terms with accounting convention which requires the write back of purchased goodwill on the disposal of previously acquired businesses. The effect of this is to give the balance sheet a somewhat anaemic look at times. In such cases investors would look to the issue of paper to allow for a significant reconstruction of the balance sheet to a reasonable level of capitalisation This financial strength should be augmented by a strong system of financial controls. While it would be impossible to stereotype the characteristics of companies which seek a listing, the above criterion should be exhibited by potential applicants if they hope to proceed to a successful listing.

Potential investors will not look at a potential investee company in isolation. They will instead examine the company in light of the industry and geographical markets in which it operates. If, for example, a potential investment is in a cyclical business (such as steel manufacture of commodity chemicals) then the timing of the flotation will be all important. Investors will need to perceive that the flotation is taking place near the cyclical trough.

Building on the last section, the purpose of this section is to introduce the results of a survey conducted among British institutional investors and investment analysts by MORI[8]. It provides an interesting insight into the types of characteristics that all attractive investment opportunities should share. As such it offers an insight into the characteristics that a potential IPO should have in order for it achieve a successful a listing.

The sample of British institutional investors was drawn from Crawford's Directory of City Connections 1995 edition. It included all major insurance companies, investment trusts, investment management groups, unit trusts and self-investing pension funds.

The universe consists of 250 investors in the top 400 investing institutions, out of which 159 interviews were completed. The response rate was 64%. The sum of the funds managed was 400 billion sterling. Interviews were conducted face-to-face between November the eighth and December thirteenth 1995.

A total of 256 analysts were nominated for inclusion in the survey. Of these 34 were untraceable. Consequently 222 were approached and 140 telephone interviews completed. The response rate here was 74%.

Criteria for judging companies

Investors were asked spontaneously to give the criteria by which they judge companies. They were then asked, along with the analysts, to choose selected criteria from a pre-coded list. Financial strength and quality of management came out as key criteria. Sample investor responses were as follows[9].

High return on capital to allow the companies to generate cash for their own expansion and positive cashflow so they can pay the dividends.

[8] 'Institutional Investors and Analysts in Great Britain', Winter 1995, MORI, London

[9] MORI Survey, ibid, p8

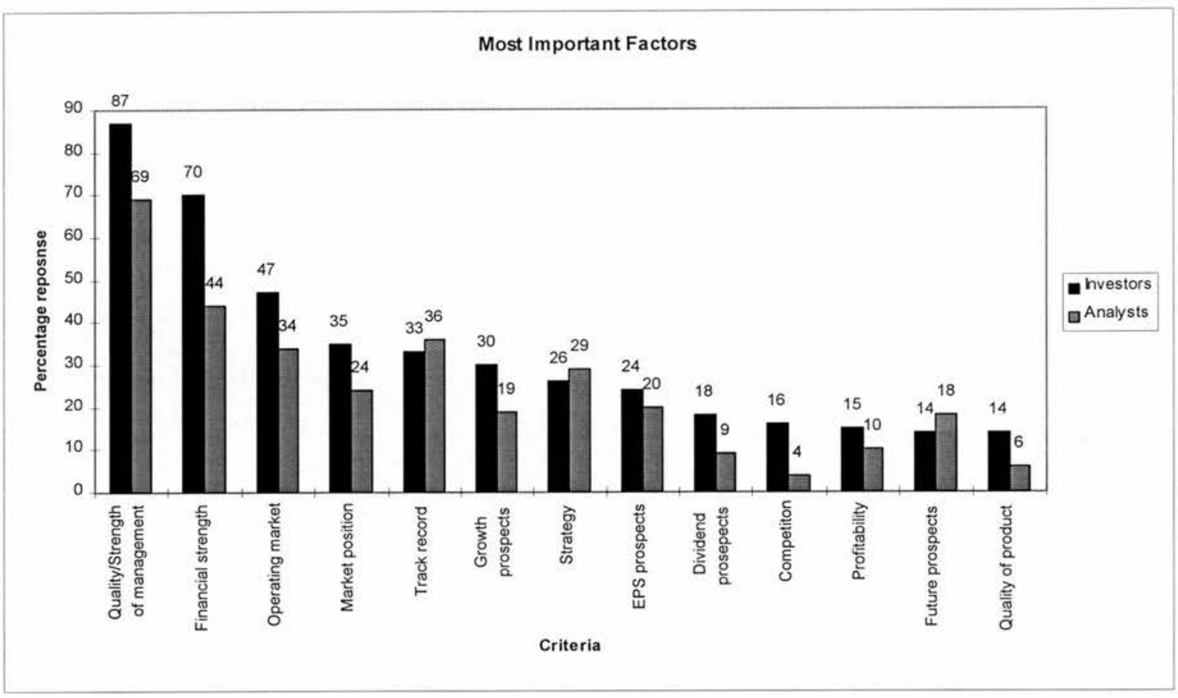
Apart from the basic analysis of the balance sheet strength and so on, the main and single most important factor is the management of the company.

The most important factor is management. Even if the company is in a poor industry or in a poor position within the industry, good management can reposition a company and make it into a successful investment.

Good management is almost essential, particularly in this day an age when if you're not doing the right thing at the right time, your business will simply not prosper, even if you're in a growth industry.

The full list of criteria appear below.

Table 1



Source: MORI Survey, ibid, p9

The base consisted of 159 investors and 140 analysts.

In a prompted survey, financial performance and quality of management came out as clear leaders is a poll of what factors were considered to most important.

Evaluating management

Given the importance of the quality and strength of the management in evaluating companies, it is important to consider how the City evaluates management. For both analysts and investors the track record is of paramount importance when evaluating management teams, with over half of both audiences citing this factor. Sample comments are given below[10].

I judge management really by its track record - for instance if the company is able to deal well during a period of recession. That really is the crux of it - the ability of management to deal with a series of problems.

The record of the company in terms of being able to cope with changes in terms of the demand for its products and services.

The track record - have they done what they'd said they'll do in the past and are they personally geared to the performance of the company.

One endeavours to identify the track record of the managers involved. It's becoming more difficult as key people are moving around from one company to another so that the time span in any one particular business is quite restricted.

The full list of responses is as below.

Table 2 (over)

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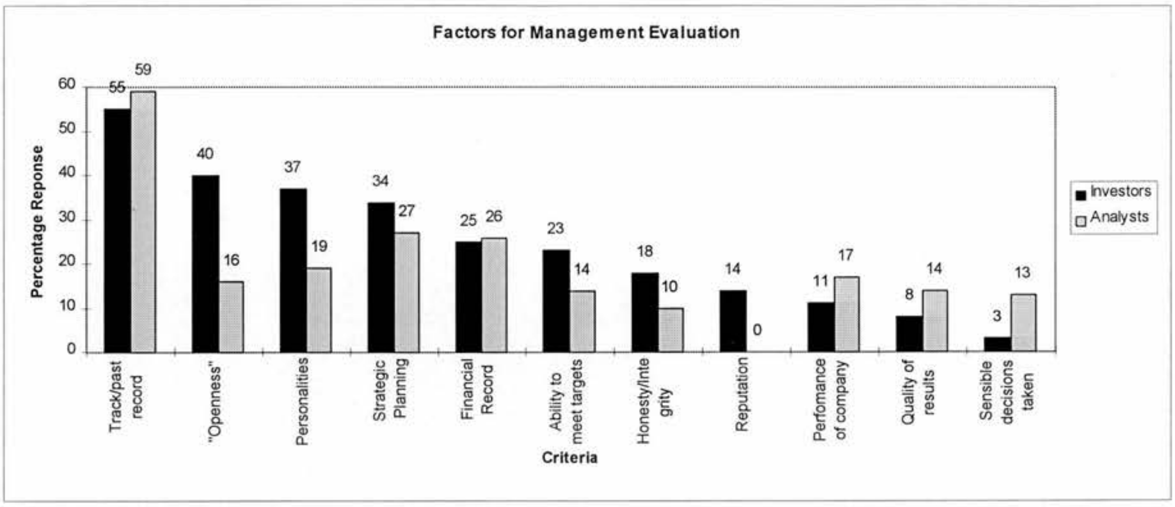
[10] MORI Survey, ibid, p11



Source: MORI Survey p12

The base consisted of 159 investors and 140 analysts.

1.4 Investors Perceptions Relating to IPOs

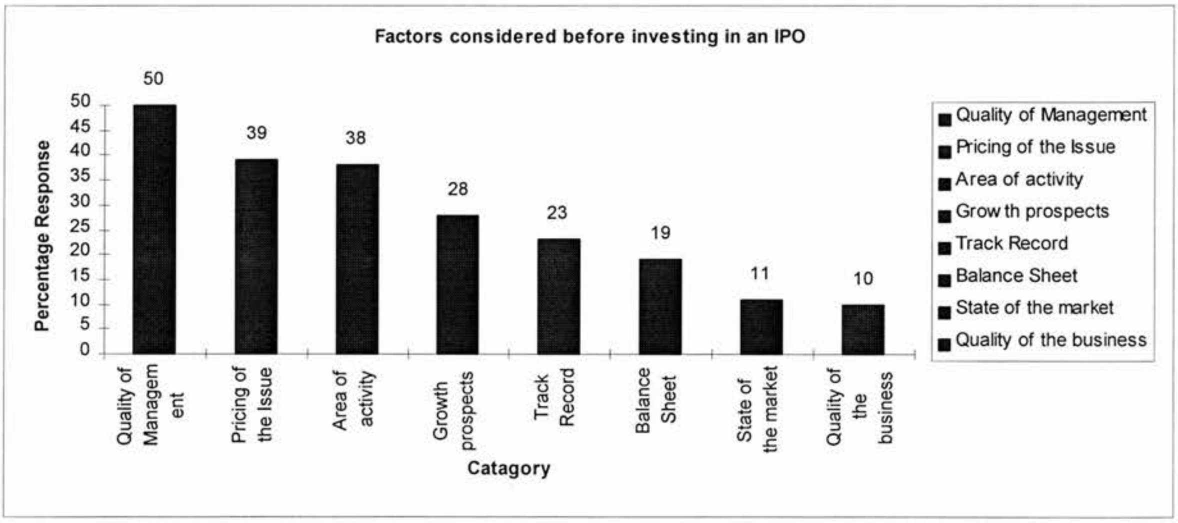
The purpose of this section is to discuss a survey of institutional investors perceptions of the IPO process in the UK. In some ways it reiterates some of the points outlined by the MORI survey discussed in the previous section but in addition it adds a fresh perspective on IPOs in particular.

The study was commissioned by the accounting firm KPMG[11]. They surveyed 105 fund managers in the UK who were responsible for managing some 640 billion of sterling assets. On average each manager had invested in 14 new issues in 1994 (the year to which the survey data relates) and can be regarded as giving a reasonable insight into the IPO process in the UK.

As indicated respondents had invested in an average of 14 IPOs in 1994. Twenty per cent of respondents had invested in fewer than five IPOs, half had invested in between ten and fifteen and twenty five per cent had invested in more than this number. A small number (four per cent) had invested in fifty new issues in 1994.

When asked what factors they considered most important when investing, those questioned provided the following responses.

Table 3



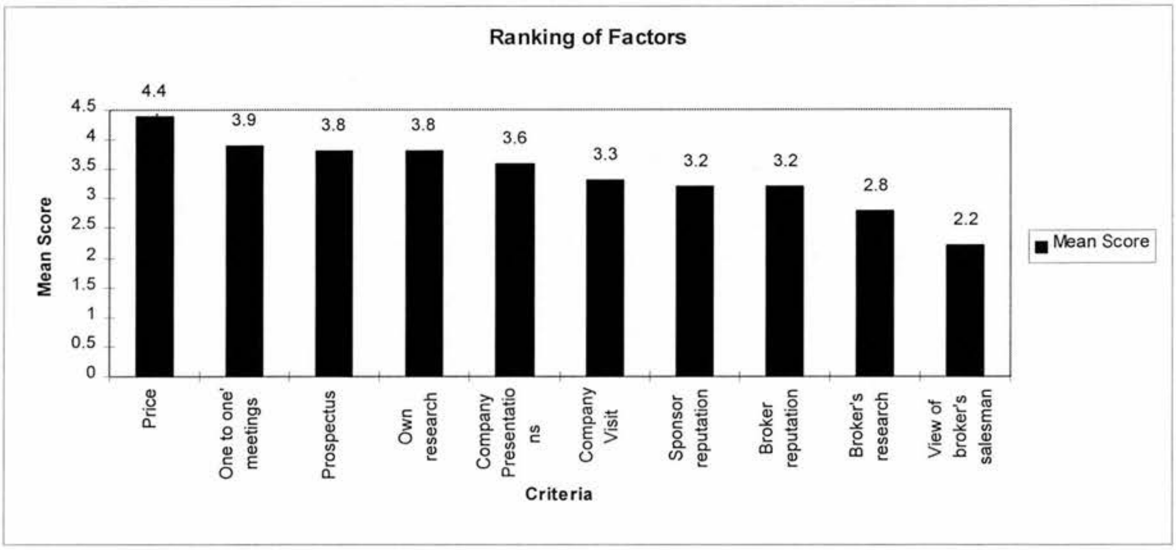
Source: KPMG Survey p2

[11] 'Flotation Survey Summary Report', KPMG, London 1994

As we can see, investors rate the quality of the management as the most significant factor in rating a new IPO. What is quite surprising is that the perceived 'quality of the business ranks a lowly eighth.

Further to this, investors were read out a list of factors relating to how they would evaluate each new IPO and then they were asked to rank them. A rank of 5 meant that the investor considered the factor very important whereas a rank of 1 indicated that the factor was considered of little significance. Mean scores were then calculated based on rankings assigned to each factor. The following set of results was produced.

Table 4



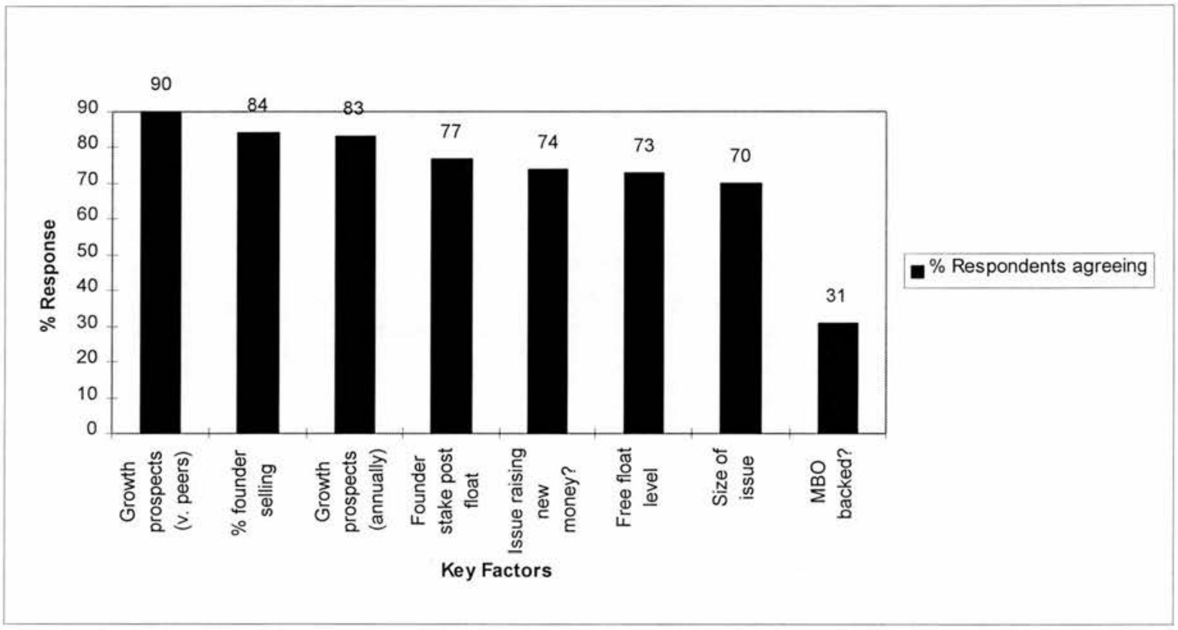
Source: KPMG Survey p3

As we can see, investors focus in the first instance on price to determine whether they will get involved in an IPO or not. What is interesting from the point of view of reputation capital is that the reputations of the sponsors and brokers to the issue rank fairly lowly at seventh and eighth respectively.

Perhaps the most interesting facet of the study was what it revealed about the time investment managers took to make their investment decisions. Eleven per cent of investors took the decision to invest within one hour of meeting with the company. Twenty-one per cent made their investment decision within 2 to 3 hours. Twenty five percent of respondents took between two days and a week to decide. Few took longer than this to make up their minds.

The study also provided interesting evidence on which factors investment managers considered important when investing in an IPO. The most important factor identified was the growth prospects for the company relative to its peers. What is of more interest is that the second highest ranked factor was the proportion of the founder's equity stake being sold. This adds further weight to the signalling argument forwarded in the literature. The eight most important factors identified were as below.

Table 5



Source: KPMG Survey p4

The only factor considered important by a minority of investors was whether the company was venture capital backed.

1.5 Conclusion

This chapter sought to introduce the reader to some of the dynamics surrounding the UK IPO market. It should now hopefully be clear just how complicated and involved the process of successfully floating a company on the stock market actually is. There are a number of issues which must be addressed by the issuing company and its advisors long before the flotation process can commence. At each stage it is crucial that the right decisions are made if a successful flotation is to the outcome of the process.

Some of the issues introduced in this chapter will be built on later in this thesis. In particular, the issue of valuation and pricing will be revisited continually throughout the remainder of this study.

This chapter has hopefully given the reader a flavour of some of the issues facing both IPO companies and those who might seek to invest in them. Some of the many other issues will be addressed in the next and subsequent two chapters.

Chapter Two

2.1 Introduction

The aim of this chapter is to build on the reader's understanding of the IPO market in the UK by introducing and discussing some of the institutional features of the marketplace and the regulatory environment in which IPOs are conducted.

This chapter builds on the content of chapter one by in the first instance introducing the various methods by which companies can achieve a stockmarket listing. After this subject is introduced, the chapter then goes on to further discuss the flotation process and the role played in the flotation process by the London Stock Exchange. Obviously, the Exchange plays a vital role in the flotation process and an appreciation of its role is most important.

By the end of this chapter the reader should be able to place the operation of the UK IPO market firmly in the context of its institutional environment.

2.2 Methods of Going Public

Companies have a choice of method of flotation ranging from a straightforward 'introduction' of existing shares to the most complex of 'offers for sale'. The choice of method most appropriate to the circumstances of the firm concerned depends on a number of factors including costs, regulation, whether or not new money is to be raised and the company's view of the shareholder profile it thinks most appropriate. Applicants without shares already listed may bring shares into listing by means of an introduction, where no real consideration need be given to pricing the shares, or by methods which are dependent on the value at the offer price of the shares being offered or placed. In summary, the options available are as follows[12].

Table 1

Value of Shares at the Offer Price	Methods Available
Not more than £25m	-Offer for Sale
	-Offer for Subscription
	-Placing (which may be combined with an offer for sale, offer for subscription or an intermediaries offer)
	-Intermediaries Offer
More than £25m but less than £50m	-Offer for Sale
	-Offer for Subscription
	-Placing (which must be combined with an offer for sale, offer for subscription or intermediaries offer)
	-Intermediaries Offer
More than £50m	-Offer for Sale
	-Offer for Subscription

[12] Table taken from 'Investment Regulation and Practice', Financial Training Ltd, London 1994 p9-14

Offer for Sale

In this method shares are offered by the company's sponsor to the general public, inviting subscriptions from institutional investors and private individuals. The shares made available may be new shares issued for cash or existing shares held by current shareholders. Normally, the offer is underwritten in that the sponsoring agent undertakes to ensure that all the shares are taken up even if the offer is under-subscribed. In that way the company receives all the money it intended to raise regardless of the actual take up in the market. In order to pool the risks involved, the broker to the issue makes sub underwriting arrangements mainly with institutional investors. Offers for sale are mandatory for offers raising more than £30m, although part of the offer may be placed. Application forms and the prospectus are advertised in the national press and are also available from outlets such as high street banks (and in particular the registrar to the issue). Offers for sale ensure the widest possible participation by investors and result in the widest possible shareholder base. The advantages of such a wide and diverse shareholder base must be mitigated by the additional costs of advertising and promoting such an issue.

Offers for Subscription

This is an offer made on or on behalf of the issuer of its own securities. The company is issuing new securities direct to the public and keeps all the money raised (i.e., there are no underwriters involved). This method is more risky in that there is no guarantee that the company will raise all the funds which it seeks. This method of issue is comparatively rare and is favoured in particular by Investment Trusts.
There are two methods by which public offers can be made.

a) Fixed Price Offer: The company predetermines the price at which the shares will be sold (in conjunction with the professional advisers to the issue and in particular with regard to the advice of the sponsoring agent) Applicants then apply for the number of shares which they are prepared to acquire at this indicated price. The process of setting the price, even in this 'fixed price' environment, in not without recourse to what the sponsor to the issue believes the market will be willing to pay. During pre-marketing of the issue the sponsor will conduct some sort of 'bookbuilding' exercise to determine the level of interest from investing institutions and what their level of interest is likely to be at a range of different prices. The consolidation of responses from individual institutions is then used as a major factor in setting the price which will become the fixed price at which the offer will be made. If the price is 'attractive'[13] the issue will be oversubscribed. The company will then be forced to scale down the actual numbers of shares received by investors under the offer to take account of this oversubscrition. A second result of the oversubscription will be 'stagging' profits. The company is normally pleased to see stagging profits as this generates interest in the company. However, too much stagging may be indicative of an issue priced too cheaply. If an issue proves to be a 'give-away' the company is unlikely to be pleased with the quality of its professional advice.

b) Tender Offer: Under an offer such as this the company requires applicants to state on their applications both the number of shares which they would like to acquire and the price which they are prepared to pay for them. The company at the centre of the issue normally specifies a price below which applications will not be entertained. Once all the applications have been received the company then fixes a single 'striking price' at which the shares are allotted to applicants who apply for stock at that price or higher. In practice, the striking price is often set a little below the 'equilibrium level' in order to stimulate an active aftermarket.

Comparing the two methods the fixed price offer has the certainty of the sum received by the company. This method is easy to understand for investors. It also encourages stags who can oversubscribe the issue when they know the striking price in advance. The tender offer does not display either of these two aforementioned characteristics and in addition may be unsuccessful if the company pitches the striking price at too near what turns out to be the aftermarket clearing price.

Placings

In a Placing new shares or shares of existing shareholders are offered to the public on a selective basis. A company's sponsor or broker sells the shares to its own client

[13] The meaning of 'attractive' will be dealt with in later sections

base - typically this is investing institutions and private clients - finding purchasers with whom the shares are then placed. Placings are particularly geared towards small companies where they have historically constituted the most favoured way of making an initial offer to the public. Versus an 'offer', a placing is a very low key operation with less publicity and no widespread advertising. The associated costs are lower but the shareholder base is less well diversified than would be the case as a result of a public offer. As the general public is being excluded from the offer the Stock Exchange has strict rules as to where and when a placing is permitted[14]. The rules are designed to allow the issuer maximum freedom in the decision on how to raise capital while ensuring an equitable distribution of shares and enough liquidity in the aftermarket to ensure active trading of the newly quoted stock. When a placing is used as the vehicle for a new issue there a number of rules which apply, such as that there must be at least one hundred placees. These requirements are outlined below.

Table 2

Money Raised	Distribution	Requirements
up to £15m	Up to 95% of the issue may be placed by the sponsor or broker with its own clients. A least 5% must be offered to independent market maker(s)	At least 100 investors taking up the placing.[a] ("Placees") At least one independent market maker.
£15m-£30m	Up to 75% of the issue or £15m, whichever is the less, may be placed with the sponsor or broker with its own clients. At least 5% must be offered to an independent market	At least 5 placees for each £1m placed.[a] At least two market makers.

[14] see Table 3

	maker(s). The remainder of the issue must be market by an intermediaries offer or an offer for sale.[b]	
£30m plus	Up to 50% of the offer may be placed. The remainder must be marketed by an offer for sale. 5% of the placed shares should be offered to at least two independent market makers.	At least two independent market makers.

Source: 'Going Public' p9[15]

[a] The first 100 investors may include employees but must exclude all directors and their associates and any other shareholders interested in more than 3% of the issued capital prior to flotation.

[b] In an intermediaries offer, all Exchange member firms, other than the sponsor and the broker, may apply for securities at the issue price to sell to their client base. It is possible for such an offer to be made in a shorter timescale than a conventional offer for sale and thus at a reduced cost.

Intermediaries Offer

An intermediaries offer is a marketing of securities by means of an offer by, or on behalf of, the issuer to intermediaries for them to allocate to their own clients. Such an offer might typically be characterised by an issue being taken by a stockbroker who would then pass the shares on to his private clients. There are a number of regulations which must be adhered to when conducting an intermediaries offer[16]. There must be a distribution statement completed by the sponsor or any securities

[15] 'Going Public', London Stock Exchange, 1992. Note that the various limits do move over time.
[16] Yellow Book chapter 4 points 16 to 20

house assisting with the offer in the appropriate form issued by the Exchange before consideration of the listing application can be made. Also, a list of the names of and addresses of the clients of each intermediary to whom securities were allocated may be required and there are further conditions which must be satisfied where the share for allocation are for a new issue. Namely, the shares must normally be allocated by intermediaries to a total of at least 100 persons except where the intermediaries offer is made in conjunction with a placing. The total number of shares reserved for allocation to existing holders must be disclosed in the listing particulars. If less than ten intermediaries apply for securities all must be given an allocation. If ten or more apply, at least ten must be given an allocation and any consequent scaling down of allocations must be effected pro rata to each application. The result of the intermediaries offer must be notified to the Company Announcements Office by the sponsor before dealings in the securities can begin.

Introduction

Where the shares of a company are already widely held and the proportion held in the publics hands is sufficient to meet the Exchange's demands the shares may be 'introduced' to the market. In an introduction no money is raised from the public either for the company or for major shareholders. The Stock Exchange does n't normally permit an introduction if a company has offered securities within a period prior to it coming to the market or if there is an intention by shareholders to dispose of shares on float. As no shares are issued and no money raised there are no advertising or underwriting costs for the company to bear. That being the case this method of float is the cheapest of the potential methods.

2.3 The Role of the Exchange

The London International Stock Exchange is empowered to exercise the functions of the 'Competent Authority' for listing in the UK under part IV of the Financial Services Act 1986 and also has responsibility for the Alternative Investment Market (which superseded Unlisted Securities Market). The Exchange's aim is to regulate listing and to facilitate capital raising by companies while ensuring that investors are protected and can have confidence in the market. These aims are achieved by ensuring that;

a) Companies have a record of trading under their present management and that the information disclosed about their history, prospects and financial condition presents a reasonable basis for investors to reach an informed investment decision.

b) Offer of securities take place on a fair and open basis allowing public access wherever appropriate.

c) Shares are freely transferable and widely distributed in order to promote trading and marketability.

d) Investors are treated with proper consideration at all times by company boards, even though the public may only represent a minority of the shareholders.

e) Company information is disclosed in such a way that all investors have equal access and an orderly market can be maintained.

The Stock Exchange has three principal roles. It facilitates raising capital by means of sale of securities in the 'new issues' or 'primary market'. It provides a means whereby interests in capital can be bought and sold in a trading market. Finally, it is responsible for ensuring that the settlement of transactions is carried out in an efficient and secure manner.

During the period covered by the empirical data used in this thesis there were two markets onto which shares could be listed in the UK. These were the 'Official List' and the USM. It was also possible to gain a listing via meeting the requirements of s535 of the Companies Act. The USM was introduced to cater for the needs of smaller companies and in an attempt to mitigate the problem of the observed 'small company' financing gap. It was hoped at its inception that companies listed on the USM would progress onto a main market listing. However, the actual numbers of companies making the transition proved to be disappointing. The Stock Exchange, fearful of the apparent failure of the USM (as indicated by the increasing average size of each new applicant) led to a rethink on how best to cope with the small company financing gap. In the first instance, this led to the creation of the 'Third Market' which was designed to fall into place behind the USM. Admission to the 'Third Market' was open to companies which had established genuine trading operations but which did n't generally satisfy the USM entry classifications. The Quotations Department does not subject the prospective issues to the exacting listing requirements of USM issues. The Third Market is, however, now defunct, due to lack of interest. At the end of March 1994 the Stock Exchange considered the merits of introducing a new small company market to try an offer a better solution to the observed problem than had in the past been offered by the USM and the Third Market. These discussions led to the creation of the Alternative Investment Market (AIM) which commenced operation in mid 1995. However, the two markets onto which shares listed over the empirical study period used in this thesis were the Official List and the USM. Details relating to them are listed below.

1. The Official List: This is the oldest and most prestigious market for publicly quoted securities. The origins of the market go back to the early days of the market when an official list of securities suitable for trading was first kept and displayed on the market floor. At this time most of the securities traded on the Exchange are companies which are listed and many others have listed eurocurrency/debt securities. Listing requirements are set out in detail in 'Admission of Securities of Listing', known as the Yellow Book, which is published by the Stock Exchange.

2. The USM: The USM was established in 1980 to provide finance to small growing companies in the UK. It offered a distinctively different regulatory regime in a separate segment of the market for companies not prepared or able to accept all of the controls of the Official List. While being significantly less stringent in its requirements, the USM offered the same capital raising opportunities. The rules for entry to the USM were set out in the USM booklet which is known as the Green Book which was published by the Exchange. The specifically designed and less stringent listing requirements were put in place to cater for companies at earlier

stages in their development than those on the Official List. As well as the initial requirements being less severe, the continuing listing requirements were similarly less onerous. Once the USM requirements had been met each company could make a decision as to if and when it wanted to move to the Official List.

Table 3[17]

	Official List	USM
Number of Companies	2,456	352
Average Market Cap.	£280.1m	£17.4
Average Daily Turnover(1)	£262.2m	£4.4m
Average Float Size(2)	£28.4m	£3.3m

(1) From 1/1/91 to 21/12/91

(2) From 1/1/87 to 31/12/91 (excluding Introductions and Privatisations)

Table 4[18]

	Official List	USM
Market Cap	Minimum £700000	No minimum
Latest Audit not more than	6 months ago	9 months ago
Minimum Trading Record	3 years	2 years
Marketability	25% of equity in public hands	10% of equity in public hands
Working Capital Letter	Statement made by the directors that working capital is adequate. Sponsors must submit a supporting letter	Statement required but no additional support letter
Minimum advertising requirements	Offer for Sale: mini-prospectus or offer notice in one national newspaper	A formal notice in one newspaper-irrespective of the method of issue

[17] 'Going Public' published by the London Stock Exchange in 1992, p5
[18] 'Going Public' ibid, p5

	Placing, Introduction and Intermediaries Offer: formal notice in one national newspaper	
Initial Stock Exchange Charges	Scale rate dependent on the size of the issue. e.g., £6080 for a company with a market cap of £10m or £13380 for one with a £50m market cap	Half the rate payable for an applicant for listing
Annual Charges	Scale rate dependent on size, - based on the nominal value of share capital. For the above example £4580 v £7880	Flat fee of £1950 for all companies with market cap less than £10m. For larger companies half the rate payable for a listed company

As can be seen from the tables above the listing requirements for the USM were considerably less severe than those for the main market.

As indicated, the USM was replaced in mid 1995 by the Alternative Investment Market (AIM). AIM is in essence very similar to the USM in terms of it's goals (to provide access to capital markets for young growth companies). It's structure is arguably more simple than that of the USM which it replaced and as a function of the generally less onerous requirements placed on companies who seek and attain an AIM listing, it is cheaper to attain a listing on the AIM. Regulations on such items as the length of trading history that the company needs to have are less strict. Similarly, companies listing on AIM do not need to use expensive City investment banks. All that is required is that a 'Nominated Advisor' be used. This need not be an investment bank but could be an accountancy firm or any other body deemed competent by the Stock Exchange to act in the capacity.

This has meant that AIM has attracted considerable interest from a number of small enterprises who (anecdotally) would have been unwilling or unable to meet the financial and operational obligations imposed under the old USM regime.

At the present day AIM has succeeded in attracting 260 businesses to list. The combined market capitalisation of the index is around £6 billion. The companies on the index have also succeeded in raising some £1 billion of new capital. It those terms AIM has successfully addressed the objectives it sough to at it's inception.

Performance from AIM company shares has been volatile, especially over the period near the index's inception, but in more recent times volatility has reduced.

2.4 Conclusion

This chapter sought to build on the framework outlines in the first chapter. Hopefully, the reader will now have a much fuller appreciation of the London Markets and their operation. The various different methods by which new listing can be achieved have been introduced at this stage due to the importance of being able to differentiate between the many different methods

Chapter Three

3.1 Introduction

This chapter builds on the work of the previous two chapters by introducing, in the first instance, the roles played by the various different players involved in the IPO process. It is important that the reader gains an appreciation of the roles played by the different agents in the IPO process as in a later chapter of this thesis they will be a fundamental part of some of the analysis work undertaken.

As one would suspect the length of the process and the number of different professional advisers involved lead to a significant cost being incurred. This chapter outlines the typical costs of an IPO both in quantum and by cost centre.

3.2 The Roles of the Players

When a company comes to the market it will have to enlist the help of a number of professional advisors. The company will need a sponsor as discussed in earlier sections, to deal with the requirements of the Stock Exchange. It will also have a stockbroker to help facilitate easy transactions of shares in the aftermarket. It will need an accountant to sign off on the accounts which will be incorporated in the prospectus and it will need a lawyer to help negotiate the myriad of legal issues which a potential new issue must deal with. Getting this team together, and getting the right team, is vital if the flotation is to be a success. The advisers can help the company decide if and when the time is right to launch a flotation and can provide the advice to make the issue a success. If, however, the team is not right the whole process can be an unmitigated failure. If the flotation proceeds but goes badly, anecdotal evidence would suggest that the market takes a long time to forget. In this time the company may well not be rewarded for strong performance as this image of being a 'failed flotation' hangs over it. As a flotation takes time it makes sense to appoint the advisers at an early stage.

In days gone by this process was dominated by the incumbent advisers (lawyers and accountants) automatically being appointed and these individuals recommending sponsors. However, in more recent times it has become common place for 'beauty parades' to take place where there is intense competition between professional service organisations to act in advisory roles during corporate flotations. Competition is based on value for money and potential corporate clients demand high quality service at an extremely competitive price and they want to enter into long term corporate relationships with these advisers. This may mean that the auditors are replaced as the reporting accountants and the company's lawyers are replaced as solicitors to the issue.

The Sponsor

The Role of the Sponsor

It days gone by it used to be a requirement of listing that every new applicant for listing appoint a sponsoring agent who was a member of the Stock Exchange. This is no longer a requirement. Instead Chapter 2 of the Yellow Book requires the appointment of an approved sponsor or a listing agent under certain specified circumstances. These are

1. For all issues which involve the issuance of listing particulars.
2. Where the listing rules require specific matters to be reported on by the sponsor to the Exchange and ...
3. Where there has been a breech in the listing rules and the Exchange thinks the appointment of a sponsor would be in the interests of the investors.

Issuers are encouraged to retain a sponsor on a continuing basis but this is in no way mandatory. The listing rules recognise that there are certain organisations which are able to act as sponsors e.g., merchant bankers and accountants. In December 1993 there were 92 sponsors in the UK[19] (54 member firms and 38 new sponsors). As part of the application process the would be sponsor gives an undertaking to the Exchange that it will fulfil its responsibilities under the listing agreement. The duties placed on a listing agent are less severe and they are not required to give an undertaking to the Exchange. It is expected that the listing agents will be corporate brokers, merchant banks or the lead manager of the relevant issue.

The sponsor plays a crucial role at the time of the flotation and in the period leading up to it. In general terms the sponsor advises the company on all aspects of going public from the initial suitability of the company to the specific timing of the issue. The sponsor may be a member of the Stock Exchange or not (as indicated earlier). Merchant Banks are frequently involved in large and complex issues but some companies appoint large stockbroking firms who act in a dual role as sponsor and broker. The key roles of the sponsor are as follows.

- Assessing the company's suitability for flotation and reviewing its structure and capital needs.
- Advising the company and ensuring that its board of directors is of a calibre and structure suitable for a floated company.
- Advising on the choice of market and the method of flotation.

[19] Source - London Stock Exchange

- Drawing up the detailed timetable and co-ordinating the activities of the other professional advisers.
- Helping to prepare the company for flotation and drafting of the prospectus.
- Pricing and arranging the underwriting of the shares.
- The overall marketing strategy.

The Corporate Broker

If the sponsor is a merchant bank a corporate broker will be appointed. A broker acting as sponsor normally combines the two roles. The broker will advise on the prevailing conditions in the market and the potential demand from the investment community for the company's shares. They will also represent the company in meetings with private and institutional investors with a view to generating a market in the company's shares and will give guidance on a wide range of subjects including issue method, marketing, size and terms of the issue and the pricing and terms of the issue. The broker also arranges the sub-underwriting and placing arrangements with the institutions. One of the main responsibilities of the broker is to act as the principal point of contact between the company, its advisers and the Exchange. The broker also gives advice on Exchange and listing requirements after the flotation and plays a vital role in ensuring a liquid aftermarket for the company's stock. The broker may be an independent company, although integrated securities firms are able to provide both merchant banking and stockbroking services.

Why smaller companies should use a regional broker?

According to Ralph Singleton, a Director of Rowan Dartington[20], one of the UK's leading regional investment banking operations, certain smaller company IPOs are tempted to use a regional broker. Using a regional broker reduces costs for the IPO company and also may mean that the IPO is treated 'more seriously' than it would be by a leading City advisor. Realistically, it is likely that the 'top man' from the regional team will look after the flotation as opposed to one of the more junior

[20] Interview with Ralph Singleton, Birmingham, 21/5/95

members of a large City team. So long as the regional practice has sufficient reputation with its institutional clients, then using a smaller brokerage may be advantageous to the issuing company.

The Reporting Accountant

The sponsor normally asks a firm of accountants (who are in many cases the auditors to the issue) to prepare a 'long form' audit report in order that they can be sure that the company is in a condition suitable for flotation. This provides a detailed financial and business analysis of the company, its financial controls, track record, financing and forecasts. The 'long form' report is not published but acts as a basis for the short form report which is, in the prospectus. In addition the reporting accountants are asked to report on the adequacy of the company's working capital needs and to comment on the accounting policies and calculations used in any profit forecast. The accountants will be expected to assist in the preparation of a statement of the company's current indebtedness. Tax planning is an important part of the accountant's role

Solicitors

The solicitors are primarily concerned with ensuring that all the legal requirements are complied with both in readiness for the flotation and in terms of information disclosed in the prospectus. Specific responsibilities include making necessary amendments to articles of association and drawing up the director's service contracts and, where needed, re-registering the company as a public limit company. In addition agreements have to be entered into between the company, its shareholders and the sponsor. These may include a placing or underwriting agreement and where appropriate, a tax indemnity. Solicitors are often asked to draw up share options schemes for the company. In order to safeguard against any conflicts of interest which may arise, its usual to appoint two firms of solicitors. One acts for the company and its shareholders and the other for the sponsor.

Other Advisers

Depending on the type and circumstances of the issue, other professional advisers may be needed. These may include Public Relations firms, Registrars to maintain share registers, Receiving bankers who handle share applications in offers for sale and Chartered Surveyors for any property valuations required.

3.3 The Costs of Going Public

Going public is a time consuming process which involves the use of a number of very expensive professional advisers. The choice of issue method depends on Stock Exchange rules, the cost involved and the likely effect on the performance of the issue in the aftermarket. For small offerings the placing is the most favoured issue method due in no small part to the fact that the costs are significantly less than those for an offer for sale and the majority of issues whose size would permit so under the Stock Exchange rules are done in this way.

On the date of the Big Bang the Stock Exchange changed its rules to allow placing to be used for larger issues, £15m in the listed market and £5m for the USM. Data from the Bank of England shows that for issues above the old £3m limit the offer for sale at a fixed price dominated. Above the limit offers for sale by tender were also popular. The tender method produces more accurate pricing of issues than fixed priced issues but in order to ensure a buoyant aftermarket a significant element of underpricing still exists. A company making an initial offering has to pay a wide range of expenses. Some of these are not affected by the size of the issue, making smaller issues relatively expensive. Whatever the size or type of the issue the company is required under Stock Exchange and Companies Act rules to publish a prospectus setting out detailed information on its financial state (and other matters). For listed companies these are set out in the listing particulars. Preparing the prospectus involves considerable work and cost in terms of accountancy and legal fees. These fees depend on the complexity of the issue and are not entirely related to the size of the issue. Another cost which is largely fixed is the statutory advertising costs. The Stock Exchange sets out the minimum advertising requirement . For AIM issues the Exchange stipulates that a formal notice must be published in a national newspaper. Although this is regarded as sufficient for a placing the issuing houses and brokers generally feel that for an offer for sale a prospectus should be published in a national newspaper (to attract public attention) For the listed market the Stock Exchange generally requires that the prospectus be published in two national newspapers. However they make an exception for issues which are within the limits for a placing, requiring the publication of a prospectus in one national newspaper and a formal notice in another. In addition the company frequently advertises its latest results to encourage demand for the issue. The costs related to the printing of the prospectus, application forms, allotment letters are related to the size of the issue but they are also related to the issue method. In a placing, for example, there is no need for the distribution of application forms and prospectus to the public. Receiving banks charges are related to the number of applications submitted and the number of allotments made and are therefore affected as much by the degree of oversubscription as the size of the issue. In a placing the registration fees are nominal or nil, because the number of initial investors is much smaller than in an offer for sale and the registration department of the issuing house often undertakes the initial registration of allotment letters. Stock Exchange charges for companies seeking a full listing are based on the market value of the company rather than the size of the new issue. These costs are disclosed in the Yellow Book. However one major cost which is based on the size of the issue is the capital duty paid by the company. That part of an initial offering which involves the sale of existing shares is exempt from capital duty. The costs of the financial institutions involved in the issue is based on the size of the issue. The issuing house/sponsor charges commission amounting to around 2% of the amount raised and there may be an additional fee charged also. The broker to the issue is paid a fee of 0.25% for arranging the sub-underwriting or placing. Under the Stock Exchange rules it is necessary to have a broker to the issue to approach the Exchange if the sponsor is not a member firm. The investing institutions which sub-underwrite offers for sale receive 1.25% of the gross proceeds as payment. In general the costs of an issue may be split out as follows. The professional fees account for roughly a third of the cost, the issuing house a quarter of the total. The other major components of the costs are the advertising costs and capital duty. The costs of a typical offer for sale might be in line with the following example.

Table 2

<u>Costs of a Typical Offer for Sale of £7,000,000</u>[21]

	£	% of amount raised
Capital Duty on New Shares	70,000	1.0
Stock Exchange Listing Fee (initial plus annual for total share capital of £14m)	7,340	0.1
Advertising Costs	98,000	1.4
Printing Costs	30,000	0.4
Extel Fees	1,500	0.0
Receiving Bank's Charges	10,000	0.1
Accountant's Fees	93,500	1.3
Legal Fees	98,000	1.4
Issuing House Fees (including sub-underwriting commission of 1.25%)	140,000	2.0
Additional advisers fees	14,000	0.2
Total	562,340	8.0

The table above quantifies the measurable financial costs to a company of going public. What it does not measure is the impact of the loss of management time to the business as they organise the flotation. Nor does this table indicate the costs of the 'underpricing' of the issue to the company. While the costs of underpricing may be quantifiable at very roughly 10%[22] of the issue proceeds the costs in terms of

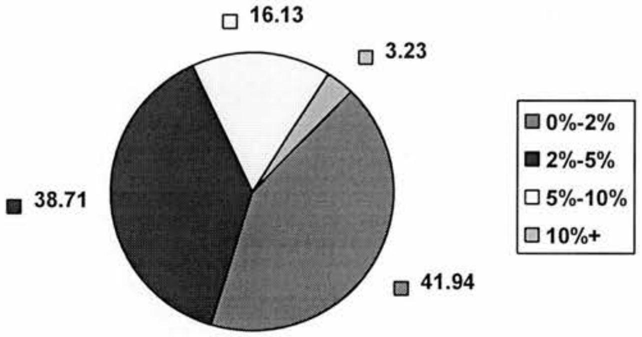
[21] Taken from Bank Of England Quarterly Report 1990 p535

[22] i.e. the price at the close of trading on the first day is likely to be some 10% higher than the price the issue was floated at.

management time are much harder to quantify. They are none the less significant. The direct financial costs of an issue are significant and concern many companies who contemplate a float. While it is hard to generalise, the following data from KPMG[23] acts as a benchmark for the kinds of financial costs which may have to be borne.

Table 3

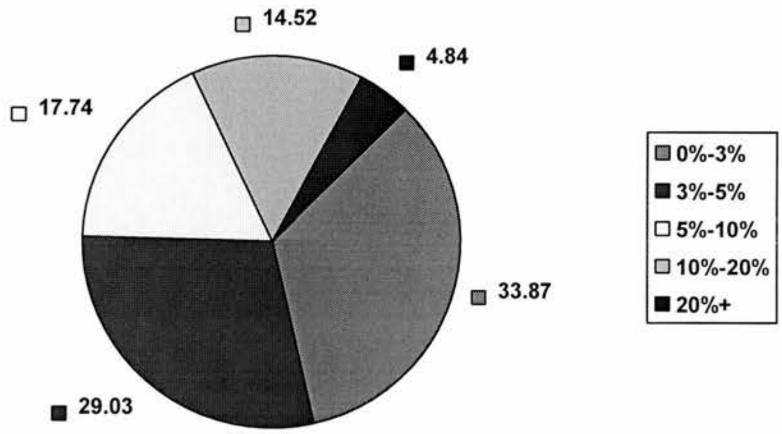
Flotation Costs as a Percentage of Market Capitalisation



As can be seen from the graph above, for nearly 80% of new issues the costs of flotation are less than 5% of the market capitalisation of the company after the float.

Table 4

Flotation Costs as a Percentage of Money Raised



[23] 'Flotation Survey Summary Report', KPMG, London 1994

The graph above shows the costs of a new issue as a percentage of money raised. As can be seen in comparison with the graph of costs as a percentage of market capitalisation these costs are higher. Only 63% of issues fall within the 5% band and 4.84% have costs greater than 20% of the money raised.

3.4 Conclusion

In this chapter the various roles played by the many players involved in the IPO process are discussed at length. This is included to give the reader more of a feel of the complexity of the process and also to put the roles of the agents involved in the IPO process (which will be important later in this thesis) into perspective.

This chapter also provides a further insight into the costs of flotation. The costs incurred in the IPO process will also feature in a later chapter of this thesis. The issue is introduced here to at least partially set the scene for the fundamental research which appears in chapter seven.

As can clearly be seen, the direct costs are substantial. Any company contemplating a flotation has to bear these considerable costs. This fact adds more weight to the earlier statement that the process must only be started when the company has a clear idea of the advantages it can gain by virtue of having a listing.

In addition to the considerable direct costs, the IPO must bear substantial indirect costs as a result of underpricing of the IPO.

Chapter Four

4.1 Introduction

This chapter starts by introducing the subject of pricing and valuation of initial public offerings. The subject of pricing is fundamental to later discussions in this thesis as it is the share price appreciation from the price set to the price in the aftermarket that constitutes the excess return that we are seeking to explain.

The pricing process is subjective in its nature and a number of valuation techniques are used by professionals depending on the circumstances of the underlying entity. The different approaches commonly used are introduced in this chapter. Also included at the same juncture is a discussion of the process by which IPOs are allocated among investors wishing to participate in the flotation process.

The chapter then goes on to introduce some of the observed anomalies surrounding the pricing, valuation and subsequent share price performance of initial public offerings. This is included by way of a preamble.

4.2 Pricing and Valuation

The pricing of initial public offerings is not an exact science. No matter how precise estimates of future earnings, dividends and cash flows may be there will always be an element of subjectivity which will influence the decisions of individual investors as they make their own value judgements. The mis-pricing of IPOs as an explanation of the observed excess returns is not an all pervasive one. There are a number of studies which assume 'correct' pricing of IPOs but the issue is worthy of examination in this thesis. There are a number of ways in which IPOs are valued both in theory and in practice. This chapter will attempt to provide detail on the methods and the rationale behind them.

Perhaps the most simple share valuation model is the dividend growth model advanced by Gordon. There are two components to investment return in equities, namely capital gains and dividend. To illustrate, if an investor subscribes for a share at 200p, expects a 20p dividend and expects to sell the share for 220p in a years time then the return on the equity will be as follows.

If we solve the following for R_e (return on equity capital)

$200 = 20 + 200 / (1+R_e)$

$1+R_e = 240/200$

$R_e = 20\%$

This implies that the expected value of the shares today will be the dividend for the year plus the expected future value of the share ex ante capitalised by the discount rate for equity. Illustratively,

$So = (DIV_1 + S_1)/ 1+R_e \ldots R_e = DIV_1/So +(S_1\text{-}So)/So$

Price(current) = This year's dividend + The estimate of the price in one year / (1 plus the return required for this equity)

We can break this simple formulation down further to show that the return on equity is the sum of the dividend forecast divided by the current share price and the change in the share price anticipated over the year divided by the current share price. In other words dividend yield plus capital gains.

A question which must be asked is what determines investor expectation of the share price in one year. The hypothetical investor who buys the stock in the future is entitled to some form of capital gain (and the dividend stream associated with holding the security). In such a scenario the value of a hypothetical share one year from now can be defined as the dividend expected to be received in the year plus the capital appreciation expected between year 'one' and year 'two' capitalised by 1 plus the required rate of return on equity for the period. Bearing in mind the two previous derivations, it follows that the price of the hypothetical stock today is the sum of the forecast dividend capitalised by the discount rate plus the forecast dividend two years out capitalised by the discount rate plus the share price forecast at the end of the second year capitalised by appropriate discount rate. The general regime holds over all time periods and as such the value of the underlying security today is the sum of all the future dividends paid by the entity discounted back to present value. This derivation is commonly referred to as the 'dividend discount model'. It assumes that the equity exists and pays dividends into perpetuity. If that is not the case then we must assume that the entity pays some form of final dividend on termination.

The essence of this approach is the same as one would use in traditional project appraisal. In 'traditional' NPV analysis we adopt the decision rule of accepting all projects where the expected sum of net present values is greater than the initial cash outlay. For a single project firm, that stream of payments discounted back to present values gives the value of the firm. Where the valuation of shares becomes more complex is where the firm involves a multitude of projects. In this circumstance, the amount of information required to fuel a hypothetical dividend growth model is immense to the degree as to make the exercise almost futile. To follow such an approach requires massive assumptions to be made on the value of future dividends.

Such payments will be predicated on future earnings which will in turn be inexorably linked to the state of the economy. In addition to such general complexities, the issue is further complicated by the impact on valuations of such events as a hostile take-over. It is possible to eliminate some of the potential problems caused by such an approach by utilising the mathematical properties of a sum to perpetuity. The essence of such an approach is that it allows us to utilise a growth rate to perpetuity using the initial dividend payment made by the firm as a basis as opposed to an estimate of each future dividend. The valuation simplifies to a more appealing formulation. This is that the value of a share today is simply the expected dividend capitalised by the anticipated return on equity less the growth rate. (with the obvious caveat that if the growth rate expected is greater than the anticipated return then the formulation ceases to work.) This formulation is frequently referred to as the 'Gordon Growth Model' following the work carried out by Gordon and Shapiro[24] in 1956.

The model is intuitively appealing but does make a number of assumptions. The first such assumption is why use r(e) as the required rate of return? We know from the work of Fisher and Hiershleiffer that an all equity firm should use the investors required rate of return as the discount rate on all projects. In terms of returns, there are only two things the firm can do with its earnings namely either pay a dividend or reinvest the funds. If the firm is taking the value maximising route it should adopt the approach which maximises shareholder value. Suppose a firm is trying to decide whether to pay a dividend of x or to reinvest the money in a taxless environment. The value to shareholders of dividend x paid at $t=0$ is simply DIV (the value of the alternative investment which can be made with the money). The value of DIV reinvested in the firm is the present value of the infinite stream of future dividends generated by the extra investment. At the end of one year the investment of DIV will yield earnings of RDIV of which (1-b) will be distributed and b reinvested. By the end of year two the earnings from the initial investment will have grown to RDIV(1+bR) of which (1-b) will be distributed. Therefore, the reinvestment will generate a stream of dividends which will be valued thus.

[24] 'Capital Equipment Analysis : The Required Rate of Profit', Management Science October 1959 p102-110

Value of reinvestment = (1-b)RDIV/(1+r(e) + (1-b)RDIV(1+bR)/(1+r(e))^2 + ...
which is a series which sums to (1-b)RDIV/(r(e) - bR)

Shareholders will prefer reinvestment when the value of reinvestment exceeds the value of the dividend i.e.,
(1-b)RDIV/(r(e) - bR) > DIV

Dividing each side by DIV and multiplying by (1-b)RDIV the criterion becomes..
R-bR/r(e)-bR > 1
Hence when R=r(e) the shareholders are indifferent between the two policies and values them equally. The shareholder prefers reinvestment when R>r(e) and prefers a dividend when r(e)>R. On that basis the firm will maximise shareholder wealth by using r(e) as the hurdle rate for investment projects.

Having accepted r(e) as the valid discount rate, what can we say about g, the rate of anticipated growth? Firstly, it's fair to say that attempting to forecast growth ad infinitum is a fairly hopeless task. We cannot use the Gordon Growth Model when g>r(e) as it yields infinite share values. In practice though it is possible to come across firms which achieve over a period of years very high annual growth rates in excess of the cost of capital. Thus we must be careful in applying such a model. However, it is unlikely that rates of growth in excess of the required rate of return can be maintained. As the firm gets larger and larger it will need to find more and more projects yielding R to maintain its growth. As the set of available investment projects is finite the firm will find this increasingly hard to do. The rational firm will pick the project with the highest rate of return first and then the project with the second highest and so on. For a firm to find a rate of return R wherever it turns there must be a constant return throughout the economy but if this the case then this rate of return must be r(e).
In practice there is some research to suggest that firms do maintain above average returns for protracted periods of time. We must assume that they do this by

constraining the reinvestment rate in the long run so that r(e)>bR. However, we can value firms which achieve super-normal growth for finite periods of time by integrating a 'super-normal' growth rate model into the standard 'Gordon' model.

In the case of initial public offerings, valuation via the traditional 'Gordon' method is complicated by a number of factors. Firstly, the firms concerned tend to be fairly embryonic and have little to go by way of a trading history. Secondly, in many cases the firms either pay an 'unrealistic' dividend or may even pay no dividend at all. This may be due in the first case to the firm being relatively well established entity with an ownership structure such that shareholders found it most tax efficient to take their profits via 'super normal' dividends. Alternatively, the firm which pays out little or no dividend may be a management buy-out type organisation which finds itself cash constrained. Venture capitalists do not normally demand high payouts on normal equity holdings from their investee companies preferring instead the potential capital gains from an exit. The fact that where IPOs are concerned there is a distinct lack of a trading history is another problematic feature. It makes forecasting future dividends from an examination of the previous payout levels distinctly difficult. Bearing in mind the problems outlined above its unsurprising to learn that practitioners don't utilise such theoretical methods in practice.

It would be fair to suggest that, where possible, 'peer group' valuation is the most commonly used method of valuing initial public offerings in the UK. Where no obvious peer group exists (such as in the recent flotation of Orange, a cellular telephone company) different methodology is used. Stockbroking firms are common exponents of these approaches in the UK. A useful example of where a 'peer group valuation proved most helpful was in the recent flotation of Macdonald Hotels, a hotel chain, which was floated in 1996 by SBC Warburg. Not only was it an interesting exercise in itself but the use of the advisors of the 'Enterprise Value' valuation parameter introduces a relatively new and worthwhile valuation yardstick. Enterprise value was first introduced in the USA a number of years ago but has only recently appeared as a widely used valuation criterion on this side of the Atlantic.

The essence of the approach is to avoid a number of weaknesses symptomatic of traditional inter-firm comparison using the price to earnings (P/E) ratio. The brokers attempted to value Macdonald with reference to the 'Enterprise Values' of other similar quoted hotel companies. The merits of enterprise values are discussed elsewhere but the key to the approach is that it allows for many of the inter company subjectivities which traditional P/E and earnings growth models fail to account for. Basically, enterprise value is the ratio of the sum of the market capitalisation of the company plus any net debt divided by the earnings of the company before depreciation, interest and taxation. This allows for different capital structures, tax rates and depreciation policies among peer group members. The merits of such an approach become immediately apparent when one considers the variety of different capital structures among hotel companies (which can either issue significant equity to finance the construction of their assets or, alternatively, use bank debt to finance the work) Similarly, the different depreciation policies adopted by different entities creates further problems in terms of cross-comparability. The brokers to the issue came up with a number of comparable firms which had the following valuation characteristics.

Table 1

Peer Group Valuation

Stock	Year End	Share Price	Market Capitalisation	EV/ EBIT	EV/ EBITD	Cal 95 EPS g	Cal 95 PER	Cal 96 EPS g	Cal 96 PER
Forte	1/96	398p	3769m	17.4x	13.2x	26	182	35	161
Friendly	12/94	146p	30m	10.7x	9.5x	152	84	33	70
Ladbroke	12/95	180p	3148m	14.2x	11.2x	2	159	24	137
Stakis	9/95	94p	449m	15.4x	13.1x	12	128	13	126
Macdonald	5/96	145p	85m	12.0x	11.0x	14	103	18	96

Source: SG Warburg Securities

What is immediately clear from the table above is that finding a comparable firm is not an easy task. In the case of Macdonald hotels the company has few real comparables. Stakis has a similar portfolio of hotels but is a much larger entity and also maintains a gaming business which the stockmarket values quite differently from the hotels business. Forte and Ladbroke have hotel operations but these entities are significantly larger than even Stakis and they also suffer from having a multitude of other operations concealed within them. Friendly hotels is a much smaller company and is possibly too small to be a viable comparative. We are therefore left with Stakis as our flawed but acceptable comparative. From the above valuations is appears that Macdonald is 20% undervalued on PER grounds and about 17% undervalued on EV/EBIT grounds. However, to be fair we should adjust for the impact forthcoming relaxation of gaming controls as having at the time on the Stakis share price. The value of Stakis shares before the speculation set in was around 88p. From this we can deduce that the premium enjoyed by Stakis is around 10-13%. Bearing this in mind the target price for Macdonald should be around the 160-165p level.

The scenario above is a fairly typical picture of the way peer group type valuations get performed in the UK. However, as previously indicated, it's not always possible or feasible to utilise this approach in all circumstances. A recent example of where a different valuation methodology was used was in the flotation of the cellular communications company, Orange. As there was no real comparable firms available the approach adopted by the advisors to the issue, ABN AMRO Hoare Govett, was to utilise a discounted cashflow based approach and to let each individual investor gain access to a rough theoretical model and to allow them to make whatever adjustments they felt were necessary to arrive at their valuation.

In circumstances where a lack of any comparable peers precludes any direct comparisons cash flow modelling is a commonly adopted technique. A common method adopted is for the firm to be valued as the sum of a short term stream of relatively forecastable cashflows (discounted back to present value at some appropriate discount rate) plus the perpetuity value of the next cashflow after the end of the forecast period where this cashflow is treated as if growing ad infinitum at some given growth rate. In many ways this model owes a lot to the Gordon Growth model already discussed. This approach is sensible in that it takes some of the inherent subjectivity out of the valuation process but even the most highly rated brokers analyst is unlikely to be able to look out much further than three years and place any real credence on the derived numbers. From the individual investors' point of view the operationalisation of this process is quite straightforward. The exercise involves looking at profit forecasts and then adjusting for non-cash items such as depreciation and for any working capital changes, taxation and dividends. The result of this exercise should be a cashflow forecast which allows this valuation methodology to be followed.

Essentially, the aim of this model is to provide as much information as possible on future cashflows before having to resort to the sum to perpetuity. If three years of future cashflow data is available then the valuation attached to this should constitute 25% of the derived total valuation. Obviously, the choice of discount rate used in the capitalisation process is vital. Small changes in the rate can have marked effects on the derived valuation. A preferred way of deriving the appropriate rate is to look to the CAPM. For the ungeared firm this should provide an appropriate discount rate.

$r_e(I) = Rf + \beta(i)\ [E(Rm) - Rf]$,

where Rf is the risk free rate, B(i) the firms beta coefficient and [E(Rm) - Rf] is the market risk premium. For a geared entity it is more appropriate to use the weighted average cost of capital as the appropriate discount rate. In such circumstance the appropriate discount rate will be...

$r_e(I) = D/(D+E).r_d + E/(D+E).\ r_e$

In this instance terms D and E refer to the market value of the equity and debt within the business. Term r_d refers to the required rate of return on debt. This will be readily available but should be somewhere between one and two percent over LIBOR. In this calculation one would think that the only term over whose value the potential investor has to make significant judgements is $\beta(i)$. The remainder of the terms in the expression should be deterministic. However, recent work on what should be used to represent the 'equity risk premium' has pointed to quite stark differences in opinion among academics. The quantum of the differences (premiums anywhere from 2 to 9%) can obviously make a very real difference to the underlying calculation to determine the weighted average cost of capital.

This type of methodology has been widely used in the UK in industries where traditional valuation techniques are inappropriate. The pharmaceutical and technology sectors have been particular beneficiaries of this approach.
Another approach which is popular in certain instances is the 'net asset value' method. Here the entity is valued against its underlying assets. The most typical example of this approach is in the property sector. In this instance investors can take comfort from the professional valuations put on assets by Chartered Surveyors and can then decide on an appropriate valuation in light of perceived growth.

With the passing of time valuation techniques have become more and more advanced and should continue to do so. The bio-pharmaceutical industry provides an excellent example. Organisations in this area are characterised by large negative cashflows during their start-ups and then large positive cash flows later in their development as all the research turns into sellable product. Due to this characteristic these firms valuations are highly influenced by the choice of the discount rate. Conventional wisdom suggests using a high rate (25%-40%). However, due to the sensitivity of the final valuation to this parameter, even an educated guess produces a final valuation which is so subjective as to be spurious. DCF models also require some estimate of the residual value of the business (as discussed). Residual values are often calculated on a multiple of final sales (as if the business had been sold on such a basis). Residuals in the biotech area can account for a very high proportion of the final value and therefore place a heavy burden on a part of the model which is subject to some fairly sweeping assumptions.

In the case of pharmaceutical companies we can modify the DCF valuations on an objective basis. The aim here is to use a more objective discount rate to reflect the differing likelihood of the various projects producing an income stream. One way of achieving this is to use the discount rates forwarded by the US Food and Drug Administration (FDA). This body produces a list of probabilities linking the stages of pre-clinical and clinical development to the probabilities of ending up with a successful drug. The current list is as below.

Pre-clinical	10%
Phase I	12%
Phase II	25%
Phase III	65%
Registration	85%

By adjusting the cash flows the model is inherently weighted for the business risk and then the cash flows can be discounted by the appropriate cost of capital. Models such as this are an improvement on the simple DCF but still don't get around the problem of residual values and the applicability of the end result to the value attached by the stockmarket. To deal with these problems we must go one stage further. For each product under development peak sales five years after launch are estimated. These values are then risk adjusted according to the phase of development the project is currently at. A multiple of the market capitalisation to sales ratio corresponding to the UK pharmaceutical sector is then applied to this number. The resulting value is market driven and risk adjusted. The expected research and development spending to progress the product through to commercialisation is calculated assuming that the R and D is committed ahead of a decision to pursue or drop a product. The weighting for each phase of the product's costs is therefore one phase ahead of the product's revenues.

An example of this approach is as follows.

e.g., A company with a single product for delivery in 1999.

Peak sales	Risk Factor	Risk Adjusted	NPV	Market Multiple
600m	65%	150m	53m	3.7x

Market Value	R and D	Risk Factor	Risk Adj.	Per share value
196m	(20m)	65%	(13m)	392p (196m/50m)

This per share value is then adjusted for and net cash held. The resulting value provides a more helpful, although still not perfect framework.

In the final analysis the process is highly subjective and the judgement plays a major role. The following section illustrates some of the practical issues relating to IPO pricing in the UK. In the first instance the perceptions of investors as to how pricing structures should be determined are illustrated. In the second, how these perceptions are translated into an offer price by an issuing house are illustrated.
In terms of pricing an IPO, the issue of Cortworth in December 1995 provides an interesting case. To quote Christopher Price in the FT (17/11/95), 'Cortworth is an example of classic new issue pricing. Take a solid performing company with a good track record and reputable management and subtract 10% from the current market and sector rating. At an issue price of 150p the forecast earnings per share are 12.2p, giving a p/e of 12.2. This compares with an engineering sector average of 12.8. The discount and the fact that good demand from institutions allowed the offer price to be increased, should get off to a good start'.
Indeed, brokers often use a pricing 'matrix' to help them decide exactly where to set the strike price for a flotation. Such a matrix follows.

The following new issue pricing matrix was obtained from Kleinwort Benson Securities. The matrix was used in the flotation of the British Technology Group (BTG)

Table 2

BTG Pricing Matrix

Placing Price	200p	205p	210p	215p	220p	225p	230p	235p	240p
Market Capitalisation (£)	35	35.88	36.75	37.63	38.50	39.38	40.25	41.13	42.00

New Money (£m)	% equity issued to placees	% equity issued to placees	% equity issued to placees	% equity issued to placees	% equity issued to placees	% equity issued to placees	% equity issued to placees	% equity issued to placees	% equity issued to placees
12	34.29	33.45	32.65	31.89	31.17	30.48	29.81	29.18	28.57
13	37.14	36.24	35.37	34.55	33.77	33.02	32.30	31.61	30.95
14	40.00	39.02	38.10	37.21	36.36	35.56	34.78	34.04	33.33
15	42.86	41.81	40.82	39.87	38.96	38.10	37.27	36.17	35.74
16	45.71	44.60	43.54	42.52	41.56	40.63	39.75	38.91	38.10
16.5	47.14	45.99	44.90	43.85	42.86	41.90	40.99	40.12	39.29

New Money (£m)	No. of shares issued to placees	No. of shares issued to placees	No. of shares issued to placees	No. of shares issued to placees	No. of shares issued to placees	No. of shares issued to placees	No. of shares issued to placees	No. of shares issued to placees	No. of shares issued to placees
12	6.0m	5.853m	5.714m	5.581m	5.454m	5.333m	5.217m	5.106m	5.000m
13	6.5m	6.341m	6.190m	6.046m	5.909m	5.777m	5.652m	5.531m	5.416m
14	7.0m	6.829m	6.666m	6.511m	6.363m	6.222m	6.086m	5.937m	5.833m
15	7.5m	7.317m	7.142m	6.976m	6.818m	6.666m	6.521m	6.382m	6.250m
16	8.0m	7.804m	7.619m	7.441m	7.272m	7.111m	6.956m	6.808m	6.666m
16.5	8.25m	8.048m	7.857m	7.674m	7.500m	7.333m	7.173m	7.021m	6.875m

All data sourced from Kleinwort Benson Securities, London

4.3 Special Situations in the IPO Market

While the valuation of the stock is obviously of prime importance, there are some instances where the valuation is of secondary importance to the manager of certain funds.

Specifically, if a corporate flotation is particularly large, such as in the case of the recent government Privatisation issues, then another factor comes into the equation. In the UK the index fund phenomenon has become increasingly prevalent. Index funds make no attempt to actively manage portfolios of stocks. Their investment objective is to match the performance of a certain specific index, such as the FTSE 100 Index. Indeed, index funds which mirror the FTSE are the most popular by some margin. In this circumstance, when an IPO is so large that it would enter the index, then those index fund managers have to participate in the flotation so that their funds correctly mirror the underlying index. The problem that many fund managers face is that while they may be able to secure some stock in the issue at hand, they may not be able to get enough stock in the inevitable rationing process to match the weighting of the stock in the index. This very predicament was outlined in an article by Norma Cohen[25].

'For most fund managers, the imminent flotation of UK Mobile telephone company Orange requires making a straightforward decision about value and price. Not so managers of index funds - those who manage a basket of stocks the performance of which is designed to mimic that of a key index, such as the FTSE. These managers have little option but to buy, no matter what the price.

From late June (1996), Orange, with a market capitalisation of between £2.2bn and £2.4bn, will almost certainly be included in the FTSE100 and any fund manager committed to matching this index will have little option but to own the shares. The problem is that Orange shares will be scarce: only a quarter of the shares will be offered to the public.

London Stock Exchange rules have long allowed companies to obtain a listing provided that they have a 'free float' of at least 25% of their share capital - in other

[25] 'Not enough Orange to go round', Norma Cohen, Financial Times 11/3/96

words, that 25% of their share capital is available for trading. The same percentage threshold applies to inclusion in the FTSE100 Index, which is made up of the largest UK companies, measured by total market capitalisation. Thus a company with a total capitalisation of £1.7bn, but with traded capital of only £425m can find itself in the FTSE.

Last September (1995), Pearson, publisher of the Financial Times, sold its 8.5% stake in BSkyB, which pushed that company's traded capital just above the 25% threshold. The stake was placed almost entirely with indexers. While BSkyB shares have traded for the most part, above the price at which they were issued, passive fund managers have been less happy about the performance of their shares in National Grid. Last December (1995) recently privatised regional electricity companies sold enough shares in the Grid for it to cross the 25% threshold and enter the index. But the December sale price of 208p has not been seen since. Prices for shares in Orange, BSkyB and National Grid were arrived at through a 'book building' exercise designed to reflect actual demand. Without demand from the index funds, one can only speculate what the share prices might have been...'

For their part, the advisers say it is not in their interest to simply obtain the highest possible share price. After all, they must approach index fund managers again and again to buy new issues and antagonising them is likely to backfire. Moreover, they are required to maintain an orderly aftermarket and setting too high a price could cost them dearly. However, the issue remains that Index funds, which own an estimated 7-8% of the UK stock market, need to buy new issues to maintain their performance objectives.

A further 7-8 percent of the market is dominated by quasi-indexers - fund managers whose strategy requires them to hold a weighting in every share in the index so that their annual returns do not deviate too far from it. Thus, very little of a company's shares may be subject to the bargaining between buyer and seller which helps determine the new issue's price.

'If 15% of the UK market is indexed, that's half of what's available' said Mr Rick Lacaille, director of structured products at NatWest Investment Managers. The fact the Orange shares are almost certain to be admitted to the FTSE 100 index...makes them '...a pretty safe one-way bet.' This point has not been lost on investment bankers who are responsible for distributing new shares to investors. 'The problem in the UK is that the fund management community is more concerned with relative performance than absolute performance', said one investment banker. 'That is what causes the real squeeze'. The pre-occupation with performance returns close to the index, or the industry median, means that even non-index fund managers want more than anything to buy shares below or at the price the shares enter the index.

4.4 Allocation of Shares in an Initial Public Offering

Needless to say, the process of allocating shares in an initial public offering is far from straightforward. The difficulties stem in the first instance from the fact that the institution marketing the issue will inevitable generate more interest in the IPO than there are shares available to allocate. This is an direct consequence of the desire of the issuer to get the issue away. In 'normal' market conditions and with an issue of 'normal' quality most brokers seem to settle on a figure of 7 out of 10 institutions presented with the opportunity of getting involved with the IPO actually taking stock[26]. The problem that arises is that appetite for each individual varies quite dramatically over time and across institutions. However, by way of illustration, the process would work something like this.

The institution would look at its list of institutional corporate clients and would set up a schedule for visiting them all. The broking institution would know the size of funds managed by the different institutional clients and from this the broking house charged with 'selling' the issue will have a rough idea of how much stock each client might demand if they decided to get involved in the issue. From this process they will be able to work out the notional maximum demand for the issue. Now the problem which the broker will have to address is that each individual client will probably have a different attitude towards the issue in hand. Consequently, the notional sterling value of each clients interest may not materialise. Similarly, within each institution, different fund managers may be more or less inclined to get involved depending on their individual style. Some managers prefer stocks which produce strong earnings, others those with high asset backing. This complicates matters further for the issuing house. These complications are further exacerbated by the fact that if an institution is particularly keen on an issue they will ask for a very large amount of stock in the knowledge that as the issue is likely to be quite small, they are unlikely to get the stock that they ask for. This phenomenon means that although the average issue is only taken by 70% of the institutions shown the company, the

[26] Evidence to support this claim was provided by Mr Adam Pollock, Director, NatWest Markets, London

average issue is subscribed at least twice. (i.e. institutions ask for twice as much stock as is actually available)

This situation creates a problem for the broker dealing with the issue. How does he/she allocate the issue among those institutions? The question is a hard one to get an answer to. Brokers are reluctant to reveal the formula they use to allocate stock in the fear that their clients will find out and try to take advantage of the situation. Despite the difficulties, stockbrokers Cazenove and Co[27]. were willing to disclose privately how the process is accomplished. They used the example of Macdonald Hotels, a recent IPO which was six times over subscribed. The brokers decided to allocate the stock to institutions in five bands. These were 835,000, 515,000, 310,000, 125,000 and 60,000 shares. Each client was placed in a band depending on the amount of regular commission the client placed with the broker in the course of normal business. Cazenove agreed that the procedure was far from ideal but they regarded the system as the best way to solve a difficult problem.
This approach was also familiar to Credit Lyonnais, another eminent brokerage. They intimated that they split the list of their institutional clients into 'divisions' and then allocated the shares according to the divisional structure.
These has been recent academic work in this area which is of interest. Brennan and Franks[28] examine how separation of ownership and control evolves as a result of an IPO and how the underpricing of the issues can be used by insiders to retain control of the entity. Using data from their sample of 69 IPOs undertaken in the UK, they show that underpricing of the IPO is used to ensure oversubscription and rationing in the share allocation process so as to allow owners to discriminate between applicants for shares and to reduce the block size of new shareholdings. The authors also find evidence that companies subject to a wide degree of dispersion of ownership are less likely to be subject of a take-over bid in the period up to ten years after the IPO. This evidence sets the institutional allocation process in somewhat of a different light. It

[27] Interview with Antony Mulliner, Director of Corporate Broking, Cazenove and Co. 8/3/96
[28] M Brennan and J. Franks, 'Underpricing, ownership and control in initial public offerings of equity securities in the UK', Journal of Financial Economics Vol 45 1997 p391 - 413

may be that the client firms have far more of a vested interest in the manner in which this process is conducted that might be immediately apparent.

4.5 The Market's Problems with the Pricing of Initial Public Offerings

As is now clear, the pricing of Initial Public Offerings is difficult. Most new firms have a relatively short trading history pre-flotation and all have no pre-float price with which investors can set expectations. If the price is set too low, the issuer does not get the full advantage of the ability to raise capital. If the price is set too high then the investor will get an inferior return and may in fact reject the offering. More significantly, perhaps, sponsoring agents who tried to sell overpriced offers would soon see their market shares slip. Without accurate pricing the chances of a market failure are high. This would inevitably lead to capital rationing for new entities which would, of course, be sub optimal. Ibbotson et al[29] intimate that there are three anomalies relating to IPOs. Namely, the first day returns of 10-15%, the cycles in the volume of new issues and the magnitude of the first day returns and finally, the long run underperformance of IPOs. The authors argue that the three anomalies are inter related in the following way.

Periodic over-optimism by investors creates 'windows of opportunity' during which many firms rush to the market, which results in disappointing long term returns to investors as these companies subsequently fail to live up to inflated expectations. In contrast, firms which issue during low volume periods typically experience neither high initial price run ups nor subsequent long term poor performance. Moreover, the patterns intimated are more pronounced for younger, smaller firms than for the more established.

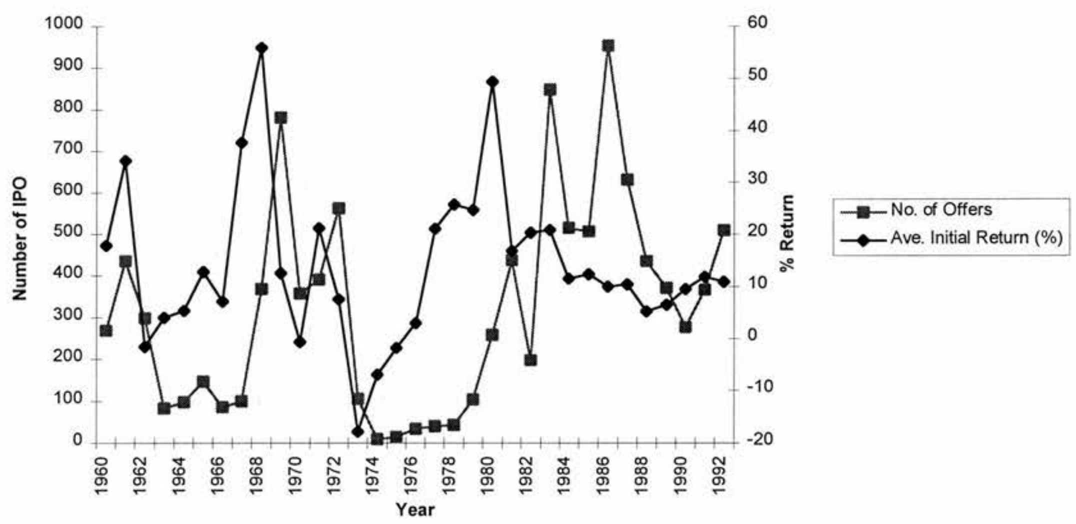
The best known anomaly associated with the process of going public is the large initial returns. The literature on IPO underpricing is voluminous and traces back to at least 1963 from a US perspective. The UK evidence is a few years more recent with the first real work undertaken by Merritt, Howe and Newbould in 1967. The phenomena has persisted throughout the 70's, 80's and 90's. Average excess returns for these time periods has been 9.0%, 15.2% and 10.9%. The cyclical nature of the

[29] R. G. Ibbotson, J. L. Sindelar and J. R. Ritter, 'The Market's Problems with the Pricing of Initial Public Offerings', Continental Bank Journal of Applied Corporate Finance, Vol 7 No. 1 Spring 1994 p 66 - 74

volume and initial returns to IPOs is also easy to identify from trend data. Ibbotson et al note that in their database of IPOs stretching back to 1960 and including some 10,626 IPOs the first-order correlation of initial returns is 0.66 for the 33 year period. Similarly, the first-order correlation for the volume of issues is even higher at 0.89. The data on the number of offerings each year and the trajectory of returns generated is shown below.

Table 3

Number of Offerings and Average Initial Returns of IPOs 1960-92



Source: Ritter ibid

The authors also identify a number of other anomalies of which we should be aware. They note that smaller offerings tend to be more underpriced than larger ones. They examine a sample of 2439 firms which went public in the 1975-1984 period and derive the following result.

Table 4

Average Initial Returns Categorised by Annual Sales of Issuing Firm

Annual Sales of Issuer	Number of Firms	Average Initial Return (%)
0	386	42.9
0 - $1m	678	31.4

\$1m - \$5m	353	14.3
\$5m - \$15m	347	10.7
\$15m - \$25m	182	6.5
\$25m +	493	5.3
All	2439	20.7

Source: Ritter ibid

4.6 Conclusion

The purpose of this chapter was to introduce some of the issues relating to the complex and difficult task of pricing and valuing an IPO. The reader should now be aware of just how difficult and subjective the process is.

There are many institutional factors that further complicate this already difficult problem. These are introduced in this chapter.

The reader will now have an appreciation of how the flotation price is arrived at. This should add to the understanding when the issue of excess returns relative to this pre-determined float price is addressed.

Obviously, the many problems involved in pricing an IPO play a part in the phenomena of observed IPO excess returns. A number of explanations have been advanced to try to reconcile the observed results with economic theory. They are dealt with in depth in the next chapter.

Chapter Five

5.1 Introduction

As is by now clear, at some stage in the life of a growing corporate entity it is likely that it will seek to attract the interests of equity investors. The initial public offering process has interested financial economists for some three decades. The reason why this subject has aroused so much interest is that the observed phenomena of abnormal average initial returns to equity investors in IPO companies is contra to one of the theories at the heart of the Modern Theory of Finance. The Efficient Markets Theory, first outlined by Harry Roberts[30] at the University of Chicago in the late sixties, implies that one should not be able to generate an excess return from following a trading rule. Research on IPOs shows that the average excess return from participating in all IPOs is significantly greater than zero. This phenomena has focused the minds of many financial economists to try to find an explanation for the observed events. As yet no explanation has been put forward in the United Kingdom or the USA which answers the question unequivocally. This chapter seeks to examine the theories advanced to date.

[30] HV Roberts 'Statistical v Clinical Prediction of the Stock Market' Unpublished paper presented to the seminar on the Analysis of Security Prices, University of Chicago, May 1967

5.2 Definitions and Evidence

As a starting point for the discussion it would seem sensible to describe in more detail exactly what is meant by 'initial excess returns' and to provide more data on what values for this statistic have been found in the UK and in the USA, where a great deal of work has been undertaken.

The studies listed concentrate on the excess returns generated over a discrete time period. The length of the time period ranges from one day to thirty days (in the normal manner for event studies) after the IPO starts trading on the market. Some of the early work was somewhat constrained by a lack of daily pricing data. The aftermarket returns for these studies are therefore weekly or monthly and are consequently somewhat less accurate. Fortunately, with the passing of time data availability has become much greater and as such most modern studies have the luxury of daily pricing data. For the purposes of the studies outlined, the absolute return to equity investors represents the comparison of the sponsor determined flotation price to the closing middle-market price in any finite time period after the stock has started trading.

Most, but not all of the studies compare the absolute movement in the stock price to the movement in some market index (e.g., the FTSE100 in London or the NASDAQ in New York) to get some feel for the excess return. This is a logical step. If we assume that the Beta of the IPO firms is unity then any excess return observed over and above that produced by the benchmark index indicates an abnormal, and unexplained, return. The use of such 'benchmarking' is common to many studies. There have been attempts to correct for the assumption of a Beta of unity via some form of CAPM based derivative but these models run into as many problems as they solve. By definition CAPM calculations require the comparison of the market returns of a stock to the returns of the market itself. This is 'a priori' unobservable. Hence some form of surrogate for 'risk' as would be measured by Beta is required. A popular candidate for this is the indicated number of uses for funds raised in the float. However this criterion is somewhat arbitrary and as such of limited benefit in the analysis. Index relative benchmarking remains the preferred alternative.

5.3 Tables of Reported Excess Returns from Previous Studies

Table 1

Review of Indicated Excess Returns of IPOs (USA)

United States

Author	Paper Published	Study Period	Indicated Initial Return (%)	Number of Issues
Reilly and Hatfield	1969	1963 - 1965	9.6	53
Stoll and Curley	1970	1957 - 1963	42.4	205
McDonald and Fisher	1972	1969	28.5	142
Logue	1973	1965 - 1969	41.7	250
Reilly	1973	1966	9.9	62
Reilly	1973	1963 - 1965	9.6	53
Neuberger and Hammond	1974	1965 - 1969	17.0	816
Ibbotson and Jaffe	1975	1960 - 1970	16.8	128
Bear and Curley	1975	1969	12.9	140
Ibbotson	1975	1960 - 1969	12.8	112
Reilly	1977	1972 - 1975	10.9	486
Block and Stanley	1980	1974 - 1978	6.0	102
Neuberger and LaChapelle	1983	1975 - 1980	27.7	118
Ritter	1984	1980 - 1981	48.4	325
Ritter	1984	1977 - 1982	26.5	1028
Beatty and Ritter	1986	1981 - 1982	14.1	545
Chalk and Peavy	1987	1975 - 1982	21.7	649
Miller and Reilly	1987	1982 - 1983	9.9	510
Tinic	1988	1966 - 1971	11.1	134
Johnson and Reilly	1988	1981 - 1983	10.5	962
Balvers, McDonald and Miller	1988	1981 - 1985	7.8	1182
Tinic	1988	1923 - 1930	5.2	70
Beatty	1989	1975 - 1984	22.1	2215
Muscarella and Vetsuypens	1989	1970 - 1987	7.1	38
Aggarwal and Rivoli	1990	1977 - 1987	10.7	1598

Table 2

United Kingdom

Author	Paper Published	Study Period	Indicated Initial Return (%)	Number of Issues
Merritt, Howe and Newbould	1967	1959 - 1963	13.7	149
Davis and Yeomans	1976	1965 - 1971	10.6	275
Buckland, Herbert and Yeomans	1981	1965 - 1975	9.7	297
Levis	1990	1985 - 1988	8.6	123
Keasey and Short	1992	1984 - 1988	14.0	222
Holland and Horton	1993	1986 - 1989	12.8	230

As can be seen from the results presented above, the average return across all the studies regardless of the exact methodology is positive in all cases and appears non-stationary through time.

This non-stationarity is confirmed by the following table.

5.4 Evidence on Non-Stationarity of Returns.

Table 3

United States	**Average Excess Return**[31]	**Number of Companies**	**Number of Studies**
pre 1975	22.47%	1961	10
post 1975	16.71%	9962	14
United Kingdom			
pre 1975	13.70%	149	1
post 1975	11.25%	1147	5

The excess return persists through time both in the United States and in the United Kingdom.

[31] Calculated as cumulative excess return from all studies in the sub-sample period divided by the total number of companies used in the constituent studies for the sub-sample.

5.5 Theories Presented to Explain Abnormal Returns from IPOs

5.5.1 The Implicit Insurance Hypothesis

The American economist Shea Tinic presented an intuitively appealing argument in his 1988 paper[32]. Tinic, whose empirical evidence came from two sub-samples from the 1930's and 1960's in the USA, postulated that the observed underpricing of IPOs was due to the legal risks to the sponsoring (issuing) house of mis-pricing the deal. The key to this idea lies in the stipulations of the 1933 Securities Act on the US statute books. This law essentially opens the issuing house up to liability for deals which go wrong, and limits the size of potential damages to a multiple of the size of the initial deal.

Tinic observed that, unlike the issue of equity by quoted stocks, there is little or no publicly available information available on firms who decide to raise money in the markets. While there may be at least some financial information about the entity available, there will be none about the quality of the management and the potential agency effects of a move from a private to a quoted company. The quality of the management is paramount[33]. The sponsor has a tough job to do to ascertain the quality of the management but can do so far more economically than individual investors. The information produced by the sponsor would carry weight with investors as the sponsor puts its reputation capital at risk. However, beyond the normal market forces which force the sponsor to obtain accurate information, the aforementioned Securities Act obliges sponsors to conduct thorough 'due diligence' to avoid liability for any false or misleading statements in the flotation documents. Tinic's data concentrates on two time periods, one before the 1933 Act and one after. He splits the sponsors into two groups, one representing those sponsors with higher reputations (and consequently with more reputation capital to lose) and one with

[32] S. M. Tinic, 'Anatomy of Initial Public Offerings of Common Stock' Journal of Finance, Vol 28 No. 4 1988

[33] This fact was recently shown in a study undertaken by KPMG. In their 'Flotation Survey Summary Report' they found that the most prevalent evaluation criterion used by a sample of 105 fund managers was the quality of the management.

lower reputations. He found that there was no difference in the level of underpricing between each group in the pre-1933 period while the higher reputation sponsors underpriced more in the post 1933 period as a statistically significant level. These findings add credence to his argument as higher reputation sponsors have more to lose by pricing the issue incorrectly and as such underprice more at the margin in order to minimise on potential legal liabilities. Tinic extended the argument further by examining the treatment of 'risky' firms (using the inverse of the gross issue proceeds as a proxy for specific risk).

He found that issues of highly speculative small firms were far less likely to be done by 'reputable' sponsors post 1933 than pre 1933. This results are intuitively appealing but flawed. Firstly, it does not explain why the sponsors don't adjust their underwriting spreads to compensate for risk. However the most damming evidence is provided by Ritter[34] who found that both 'firm commitment' and 'best efforts' deals struck in the USA were underpriced to the same extent. If the main reason to underprice was to mitigate risk then one would expect this not to be the case as in the 'best efforts' case the underwriting sponsor is exposed to less risk. On that basis this US[35] specific explanation can be discounted.

[34] J. Ritter, 'The Hot Issue Market of 1980', Journal of Business 87 April 1984

[35] 'Best Efforts' and 'Firm Commitment' offers are peculiar to the USA, as is the 1933 Securities Act. The IPO underpricing phenomenon is world wide.

5.5.2 Excess Returns Due to Information Asymmetries

One of the more prevalent theories to explain IPO underpricing is the 'asymmetric information' theory. The two most significant contributors to this literature are Baron[36] and Rock[37]. The models advanced are not based on any idea of anti-competitive practices among sponsoring banks nor are they predicated on the existence of intricate schemes of indirect compensation to explain IPO underpricing.

Baron published his findings first. His model indicates that a sponsoring bank has two major functions. The first is to advise the IPO firm on the issue price, and second to distribute the issue to investors once the issue price has been set. The underwriting function provided by the sponsor is assumed to be irrelevant as the issuing firm and the sponsor are assumed to be risk neutral. In order to provide a worthwhile service to the IPO firm the sponsor is assumed to have more information about the demand for the securities being issued than the issuing firm. As the issuing firm can't observe the effort made on the part of the sponsor to underprice the issue, the sponsor can minimise its effort in selling the securities. One way to accomplish this is to underprice the securities. Consequently, the sponsor can trade off any compensation from not underpricing against the benefits of underpricing in terms of the reduced distribution effort. Given the scenario outlined above, a certain degree of underpricing is suggested by Baron.

This explanation seems plausible but has been challenged by the work of Muscarella and Vetsuypens[38]. Muscarella and Vetsuypens examine this informational asymmetry by comparing the initial returns from 'self-marketed' sponsoring banks listing on the US markets for the first time with offerings made by other firms who did not directly participate in the selling and distribution of their own shares. Given the implications of the Baron model we would expect that the 'self underwritten' IPOs conducted by the sponsoring banks to exhibit lower levels of initial returns when compared to the sample of 'normal' firms employing sponsors to sell the

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[36] K. Rock, 'Why New Issues are Underpriced', Journal of Financial Economics, 15 January/February 1986

[37] D. P. Baron, 'A Model of the Demand for Investment Banking Advising and Distribution Services for New Issues' Journal of Finance 37 September 1982

[38] C. J. Muscarella and M. R. Vetsuypens, 'A Simple Test of Baron's Model of IPO Underpricing' Unpublished Manuscript, Southern Methodist University 1987

issues. The evidence presented by Muscarella and Vetsuypens found no significant difference in levels of underpricing between the two groups thereby placing a shadow of doubt as to the explanatory power of Baron's model.

Rock's 1986 paper presented a different explanation to the IPO underpricing phenomenon while remaining broadly within the theme of asymmetric information. Rock focused upon the information held by two distinct investor groups. He postulated that the 'informed' held more information than the 'uninformed'. For Rock the sponsor pricing the issue is regarded as an exogenous factor. Rock considers a hypothetical issue of unseasoned stock where all potential investors are uninformed as to the true value of the stock. Investors can, however, acquire knowledge of the true value of the stock but do so at the expense of incurring investigation costs. Investors who commit to acquiring such information only subscribe for shares if the actual true value of the stock (net of investigation costs) is strictly greater than the float price. In issues where the actual value of the stock is less than the float price only uninformed investors will be willing to subscribe for the stock and as such will receive a full allocation. Where the issue is underpriced (i.e., the revealed true value to the informed investors is more than the float price) both the informed and the uninformed investors will apply for shares and there will be rationing. In this context the uninformed investors are faced with a 'winner's curse'. They will have a greater chance of being allocated a full quota of shares in an undersubscribed (and hence overpriced) issue than in an oversubscribed issue. Rock argues that uninformed investors will only enter the IPO market if their expected return form so doing is greater than the risk-free rate. To achieve this, he argues, IPOs must be underpriced. Essentially the logic behind that argument is simple. Sponsors have to offer securities at a discount to their aftermarket prices in order to keep the uninformed investors in the market. Rock's analysis indicates that uninformed investors may be characterised as those who apply for shares across all offerings in a non-discriminatory manner. He argues that the expected returns from such a strategy can be proxied by weighting the initial returns by the probability of obtaining an allocation of shares. Given the 'winner's curse', uninformed investors should earn an average return across all issues equal to the risk free rate.

Rock's model offers an interesting explanation to the underpricing phenomenon. However, like all theoretical models, it is open to criticism. A paper by Keasey and Short[39] evaluates the model and concludes that it rests on a number of conflicting assumptions and furthermore that it produces propositions which are difficult to test. Rock's analysis starts from the premise that IPOs are inherently mispriced. From this mis-pricing, the uninformed investors obtain a disproportionate amount of overpriced IPOs because the demand of the informed investors for underpriced IPOs causes the latter offerings to be rationed. Needing the interest of the uninformed investors in order to ensure that offerings in general are fully subscribed, the issuers underprice offerings to attract their custom. This raises the question of whether the 'winner's curse' is to be seen as specific to individual issuers or general to the new issue market. If it is to be considered a market phenomenon, then the argument suffers from the classic 'free rider' problem: why should individual investors solve a general market problem at a cost to themselves? As the uninformed will expect all IPOs to be underpriced to circumvent their 'winner's curse', it is in the individual issuer's interest to cheat and not underprice the offering. From a market perspective, Rock's model does not explain how the equilibrium of underpricing by all issuers is maintained in the presence of a free rider problem. For Rock's argument to hold, the existence of a visible agent is required in the form of an investment banker who has incentives to ensure that the underpricing equilibrium is maintained. However, if the issuing market is at all competitive, there will be pressures on investment bankers to be more accurate in their pricing, as firms who are seeking a listing will be unwilling to bear the costs of initial mis-pricing. Therefore, in the presence of competition, investment bankers will be unable to pass on the costs of their potential to misprice via underpricing IPOs. However, their ability to do so lies at the heart of the 'winner's curse' model.

[39] K. Keasey and H. Short, 'The Winner's Curse Model of Underpricing: A Critical Assessment', Accounting and Business Research Vol 23 No. 89 1992 p74 - 78

A second key assumption of the 'winner's curse' model is that there are two groups of investors, the informed and the uninformed. The listing firm and its advising agents are both assumed to be members of the uninformed set. The informed investor is portrayed as undertaking costly investigations and being able to spot and profit from mis-priced securities. Rock argues that informed investors earn a positive return which may be seen as 'remuneration for showing where capital should best be allocated'.(p187) However, in terms of the model as Rock defines it, it would be useful to know why all investors do not become informed as both the informed and the uninformed are assumed to have the same wealth and utility functions. Its hard to see how this can hold in the long run given that informed investors earn positive returns on their investments while the uninformed earn the riskless rate. Similarly, it would be of interest to know why uninformed investors would consider investing in IPOs knowing that they can only earn a return equal to the riskless rate.

In addition to the points made above the authors note that the 'Winner's Curse' model is dependent on the assumption that the issuers are part of the uninformed set. For Rock's model to hold, the informed investors must have more information than the issuers for if this were not the case, issuers would not make pricing mistakes which could be recognised by investors as being profitable to themselves. Rock relies heavily on the importance of this assumption and offers two reasons for regarding the issuers as being uninformed.

First, he argues that issuers give up their information advantage by revealing and certifying their proprietary knowledge to investors in the market, both directly (via the prospectus) and indirectly (by how aggressively the offer is priced). However, whilst the firm reveals its proprietary knowledge to the market, this information is revealed to all participants, both informed and uninformed. Therefore, no informational advantage need be gained by any group of investors. Moreover, the firm will be unable to reveal all such knowledge to the market by such direct means as the prospectus.

Second, Rock argues that, whilst the firm and its advising agents have more information regarding the prospects for the firm than any single individual, they know less than the individuals in the market combined. However, there is no obvious mechanism to share information when contemplating buying shares in an IPO. The assumption that the pooled knowledge of the market is greater than that of the firm and its advising agents would be acceptable once trading has started. However, prior to commencement of trading in the secondary market, Rock's model does not explain how the knowledge held by single participants can be transferred to the market as a whole, especially in light of the explicit assumption than informed investors cannot sell their private information.

In his model, Rock achieves the consistency between beliefs and actual probabilities necessary for the existence of an underpricing equilibrium by assuming that the uniformed investors are sufficiently large in numbers. In his formal proofs of the conditions pertaining to an underpricing equilibrium, the size of the uniformed investor set is allowed to approach infinity in the limit and therein may lie a key difficulty with Rock's analytical model of the 'winner's curse'. If the uninformed set of investors approaches infinity in the limit, then this implies, given that the individual unit of demand is bounded from below, that overpriced shares as well as underpriced shares will be rationed. Furthermore, given the assumed limit placed on the size of the informed demand the impact of informed demand on the rationing process approaches zero as uninformed demand approaches infinity. Thus as the number of uniformed investors approaches infinity in the limit, the bias toward rationing underpriced issues approaches zero in the limit. Thus, achieving the consistency necessary for an underpricing equilibrium leads Rock's analysis to undermine the argument at its core: namely that IPOs are underpriced because of the 'winner's curse'.

A further recent addition to the literature further undermines Rock's theory. Recent work by Hanley and Wilhelm[40]. They present evidence that suggests that institutional investors capture a large fraction of the short run profits associated with IPOs. However, the note that this 'favoured status' carries with it a 'quid pro quo' expectation that institutions will participate in the less attractive offers as well. They use this finding to add further weight to the thesis that underwriters behave strategically in their allocation of IPOs. However, this finding also runs against the intuition of the Rock model where 'informed' institutions use their informational advantage to avoid overpriced offerings. The finding of this study point to them not being able to avoid the overpriced offers.

Carter and Manaster[41] present a model similar in spirit to the Rock model. Rock argues that IPO underpricing compensates uninformed investors against the risk of trading against superior information. In their model, consistent with Rock, the greater the proportion of informed investor capital participating in the IPO, the greater the equilibrium underpricing. If investors have scarce resources to invest in information acquisition, they specialise in acquiring information for the most uncertain investments. Since informed investor capital migrated to the highly uncertain IPOs, the underpricing and subsequent price run-ups for these firms are greater. Underpricing is costly to the issuing firm. Therefore low risk firms attempt to reveal their low risk characteristics to the market. One way of doing this is to select underwriters with high prestige. Carter and Manaster present evidence that underwriter prestige is associated with the marketing of low risk IPOs. Explicitly the authors examine two hypotheses. These are a) that on average prestigious underwriters are associated with IPOs of low dispersion of possible firm values and, b) that on average, prestigious underwriters are associated with IPOs which experience less of a price run up in the aftermarket.

[40] K. Weiss Hanley and W. Wilhelm, 'Evidence on the strategic allocation of initial public offerings' Journal of Financial Economics Vol 37 1995 p239 - 257
[41] R. Carter and S.Manaster, 'Initial Public Offerings and Underwriter Reputation', Journal of Finance, Vol XLV No. 4 Sept 1990 p1045 -1067

To test these assertions the authors examine a sample of 501 issues which floated in the period 1/1/79 to 17/8/83. For the authors, price run up is defined as the price appreciation in the first twenty days of aftermarket trading. Sponsor reputation is taken from the positions each of the underwriting syndicated attain on the 'tombstone' announcement made in the financial press[42]. The authors then ran a series of regressions to determine if there were any significant relations along the lines of those hypothesised. The evidence found by the authors for their sample could not allow either of their hypotheses to be rejected at normal levels of significance. Studies by Koh and Walter[43] and Levis[44] test implications of the Rock model. In both of these studies the initial returns from underpricing of new issues are weighted by the probability of obtaining shares for applications of a given size. The evidence from Koh and Walter from Singaporean offerings indicated that the significant excess returns disappear across all application order levels once rationing is incorporated into the initial returns. In particular, investors adopting the uninformed strategy of applying randomly for shares fail to achieve significant initial returns on average for all order sizes. This result would appear to be consistent with the model advanced by Rock. The Levis study, which focused on UK IPOs, produces some evidence of positive scale adjusted returns across a number of application sizes. This indicated that if Rock's model is correct it only accounts for some of the underpricing observed in the UK market.

Carter and Manaster[45], in their 1990 paper, postulate that the greater the proportion of informed investor capital participating in an IPO, the greater is the level of underpricing. Their model is not dissimilar to the Rock model where he argues that underpricing compensates uninformed investors for the risk of trading against superior information. In this paper the authors argue that if investors have a scarce

[42] This is basically the approach adopted by Hayes in his 1971 paper. Ref., S. Hayes, 'Investment Banking - Power Structure in Flux', Harvard Business Review 49 1971 p136 - 152

[43] F. Koh, T. Watlter, J. Lim and N. Chin, 'Signalling and the Valuation of Unseasoned New Issues Revisited' Journal of Financial and Quantitative Analysis 24(2) 1989

[44] M. Levis, 'the Winner's Curse Problem, Interest Costs and the Underpricing of Initial Public Offerings' The Economic Journal 100 March 1990

[45] R. Carter and S. Manaster, 'Initial Public Offerings an Underwriter Reputation', Journal of Finance, Vol XLV No. 4 Sept 1990 p1045 - 1067

resource to invest in information acquisition, they focus their activities on the most uncertain investments. Since informed investor capital migrates to the highly uncertain IPOs, the underpricing and the subsequent price run up for these IPOs are greater. Underpricing is costly to the issuing firm. Therefore, low risk firms attempt to reveal their low risk characteristic to the market. One way of doing this is to select underwriters of high prestige. In this paper the authors provide evidence that supports the theoretical result that underwriter prestige is associated with the marketing of low risk IPOs

The model that the authors derive predicts that the price run up for issuing firms will be less for underwriters with greater prestige. Implicit within this model is the supposition that investment banking firms choose to develop reputations and that issuing firms will employ underwriters with a reputation appropriate for the σ level of their IPO.

One economic environment that supports the specialisation of underwriters with respect to risk levels is similar to that put forward in the Titman and Trueman[46] analysis. In this environment, informational asymmetries play a major role. The risk level of the issuing firm is private information to the firm, and the ability of underwriters to estimate the values of risk and to communicate it via the issue prospectus varies with their skills.

Prestigious underwriters are adept at identifying risk. They avoid high risk firms in order to increase the precision of the issuing particulars, to minimise participation of informed investors and to maintain their reputation. As a result they charge higher fees but are able to offer low risk corporate clients relatively low levels of underpricing. Additionally, the maintenance of relations with low risk firms increases the expected value of future offerings. Prestigious underwriters earn economic returns in equilibrium. Non-prestigious underwriters undertake IPOs of those issuing firms that are unsuitable for their prestigious counterparts. As in Titman and Trueman, investors are provided information about risk levels and, therefore, the level of informed investors through the issuing prospectus and the reputation of the

[46] S. Titman and B. Trueman, 'Information Quality and the Valuation of New Issues', Journal of Accounting and Economics, June 1986 p159-172

marketing underwriter. Public information about the firm and its risk level is more precise for issues marketed by prestigious underwriters. Because more prestigious underwriters charge higher fees while more precisely revealing risk levels, only low risk firms find it worthwhile to use their services. Even in the presence of higher fees, the increase in the relative offering price (a decrease in underpricing) makes the choice of prestigious underwriter worthwhile for low risk firms. This generates a signal regarding the issuing firm's risk level. Thus, attempts by high risk firms to signal falsely by employing prestigious underwriters are not beneficial. The prestigious underwriter will identify a firm's risk level, assess the appropriate level of underpricing and charge a higher fee than if the firm had gone to a non-prestigious underwriter. Conversely, low risk firms cannot be lured to the lower fee structures of non-prestigious underwriters. In order to maintain their investor base, non-prestigious underwriters must maintain their usual levels of underpricing. The lower fees are not sufficient to offset the increased costs of underpricing.

There are scenarios that could motivate the development of underwriter reputations. Investment bankers typically engage in many activities, not merely the underwriting of IPOs. It is possible that the development of reputation may be to protect the value of other non-IPO activities. Fortunately, from the point of view of IPO underpricing, all scenarios that result in underwriter reputations being correlated with risk are observationally equivalent. The model the authors present allows for the empirical verification of the following hypotheses.

1) On average, prestigious underwriter are associated with IPOs of low dispersion of possible firm values.

2) On average, prestigious underwriters are associated with IPOs which experience less price run up.

The authors sample consists of 501 issues which commenced trading between the first of January 1979 and the seventeenth of August 1983. The price run up used in the testing of the second hypothesis concerns the price appreciation in the initial two week period in the aftermarket.

The first hypothesis was tested using a linear regression model. The standard deviation of the price run up was defined as the independent variable and the reputation variable used as the dependent variable. The model suggests that the reputation variable provides incremental information about the possible dispersion of possible firm values. As an examination of its contribution, the reputation variable is included in the regression with additional control variables.

1. Insider shares: This is the average fraction of the total dollar offering that is represented by shares being sold by management. The level of share sales by these individuals is held to convey some information.
2. Offering Size: This is the natural log of the average gross proceeds, in billions of dollars, of an underwriter's issues. Its been suggested that more prestigious underwriters are able to market larger offers of equity.
3. Average Age: This is the average of the years of existence of the firms marketed by the underwriter. A firm's age has been suggested as a proxy for the difficulty in valuing a firm.

As predicted , the coefficient of reputation is negative and significant. This indicates that the standard deviation of price run ups were higher for IPOs handled by less prestigious underwriters. This variable provides more explanatory power than any other variable in the regression model. However, insider shares, firm age and offering size all produce significant results. In the multivariate analysis, none of the individual coefficients is statistically distinguishable from zero. However, the hypothesis that all coefficients are jointly zero is rejected at the 10% level. Evidently, mutual correlation among the dependent variable makes interpretation of the regression coefficients difficult.

Table 4

Regression of the Standard Deviations of IPO Returns on Selected Explanatory Variables

No.	Intercept	Reput'n	Insiders	Log Offer Size	Age	Ad R squared	F
1	0.455	-0.025				0.262	9.53
		(-3.09)					

2	0.376		-0.339			0.175	6.10
			(-2.47)				
3	-0.045			-0.077		0.245	8.79
				(-3.39)			
4	0.399				-0.009	0.194	6.77
					(-2.60)		
5	0.152	-0.004	0.028	-0.051	-0.006	0.226	2.75
		(-0.15)	(0.13)	(-0.80)	(-1.23)		

Source: Carter and Manaster, ibid

To test the proposition that the price run up is negatively related to reputation, the sample is divided into two groups, prestigious and non-prestigious. A difference in means test is then performed for each group. The mean return for the prestigious underwriter group was 0.1316. For the non-prestigious group the mean was 0.1950. The means are different at the 5% level.

Therefore the authors successfully extend the Rock model by showing that the greater the proportion of informed capital participating in an IPO, the greater the equilibrium price run up. As investors have scarce resource to invest in information acquisition, they will specialise in acquiring information about the most risky investments. With a migration of informed capital to the IPOs with the largest dispersion of possible secondary market values, these firms will experience the largest price run up. As the price run up is injurious to the issuing firm, low dispersion firms will attempt to reveal their low risk characteristics to the market. They do this by selecting high prestige underwriters. To maintain their reputation, prestigious underwriter only market IPOs of low risk firms. As a result, a signal in the form of underwriter reputation, is provided to the market.

An interesting adjunct to the literature in the area of information asymmetry has been put forward by Chemmanur[47]. He attempts to formalise a popular explanation for the

[47] T. Chemmanur, 'The Pricing of Initial Public Offerings: A Dynamic Model with Information Production' Journal of Finance Vol XLVIII No. 1 March 1993 p285 - 301

underpricing of IPOs which is popular with practitioners. This is that underpricing generates publicity about the IPO and induces investors to learn more about the firm. This then leads to a runup in the secondary market share price, and consequently is in the best interests of the firm going public. Chemmanur attempts to formalise this model by developing a scenario in which underpricing is generated by the desire of firm 'insiders' to induce information production about their firm. In this model the organisational insiders have private information about the quality of their firms projects, outsiders may acquire information at a cost to reduce this information asymmetry. The firm sells stock in an IPO and again in a second offering, made after trading begins in the secondary market. Insiders of high value firms are motivated to maximise outsider information production so that this information will be reflected in the secondary market price of their firm's equity, increasing it's expected value. However, since such information production is costly, only a lower IPO share price will induce more outsiders to produce information. The equilibrium offer price, which may involve underpricing, emerges from this trade-off.

His model generates implications which are consistent with some of the more recent empirical work on IPOs. Namely, that IPOs that are oversubscribed to a greater degree are subject to greater underpricing; that underpricing is greater for those firms with projects that are harder to evaluate and thirdly that it is often in issuers interests to price equity in the IPO below the highest price that they can sell and this results in higher proceeds from the combined primary and secondary offerings.

5.5.3 Underpricing as a Function of Ex-Ante Uncertainty

American economist Ritter provides a thesis that builds on some of the arguments presented in the previous section. Ritter notes that the greater the ex-ante uncertainty surrounding the after-market price in an offering, the greater the amount of underpricing needed to persuade investors to get involved. The persistent underpricing noted by Ritter (and many others) does not imply that an investor can expect to realise excess returns due to the institutional features of the equity markets. This is mainly concerned with the capital rationing normally symptomatic of IPO issues. The majority of IPOs are subject to this rationing. If rationing were random across all issues then there would be no real problem as it would merely mean that the atypical investor received a smaller percentage of these investments on which high initial returns were made. However, the rationing process is not random. Also IPOs are subject to a 'winner's curse' phenomenon (i.e., the investor tends to get allocated proportionately less of the IPOs which subsequently perform best in the aftermarket.) In equilibrium investors incurring investigation costs attempt to identify which of the potential IPOs are indeed the 'best investments' as then these investors should earn a sufficient return to advocate the incursion of these costs. However, it is these actions which create the winner's curse for the other 'representative' investors who have not incurred the investigation costs. Faced with this 'winner's curse' problem, the representative investor will only submit a purchase order to participate in an IPO if on average all IPOs are underpriced. The magnitude of the underpricing and hence the conditional returns is directly related to the level of ex-ante uncertainty surrounding the issue. Generally, Ritter's argument runs that there is more to lose as levels of ex-ante uncertainty increase. Consequently, in order to be willing to submit a purchase order for shares in an offering with greater ex-ante uncertainty, a representative investor demands that more money be 'left on the table' in an expected value sense, via underpricing. Ritter attempted to incorporate this uncertainty by using two measures to proxy for uncertainty.

Firstly, and perhaps more intuitively, Ritter argues that one can use the age in conjunction with some mix of the price to book ratio and the annual turnover to proxy for risk. Secondly, he argues that one can look to the standard deviation of returns post the flotation (first 20 days) to proxy risk. Ritter regressed initial returns on the two proxy risk measures for a sample of 545 firms which went public in the USA in the period from April 1981 to December 1982. The weighted least squares regression method was used to overcome difficulties with heteroscedastic error terms. The derived results are included in the table below.

Table 5

Weighted least squares regression - initial return as dependent variable

Constant	Log (1 + no. of uses of proceeds)	Reciprocal of gross proceeds	R - squared
-0.0268	0.0691	83.578	0.07
(0.0360)	(0.0209)	(18.561)	

Source: Ritter, ibid

The positive coefficients on the independent variables indicate that investors interpret these measures as positively correlated with ex-ante uncertainty. Of particular note is the coefficient of 83.578 relating to the inverse of the gross proceeds. This clearly indicates that smaller IPOs produce higher average initial returns, all other factors being held constant. The R squared of 0.07 is very low. We would of course normally associate this with a low level of explanatory power. However, the low value is in line with what we should expect. A high value would have been interpreted as the actual initial return on an investment being able to be determined before the fact. The hypothesis states that there should be a positive relation between ex-ante uncertainty and initial return. The positive relation is a function of the difficulties investors face in evaluating the actual initial return from a high risk issue a priori. Consequently, the low R squared is consistent with the theory. In this paper Ritter also sought to test a related proposition. He postulated that if the underpricing equilibrium was enforced by sponsoring institutions with reputation capital at stake then any sponsoring firm which cheats by underpricing too much must lose customers (i.e. see its market share decline) or else there would be no incentive not to cheat. Similarly, if on average the sponsor underprices too little average excess

returns will be too small the investors under the 'winner's curse' will stop doing business with this underwriter. Ritter used regression analysis once again to test this theory and was able to conclude that the market did indeed penalise underwriters who cheat on the underpricing equilibrium.
Ritter found that initial returns were negatively related to sales values and that the relation of post issue deviation of returns to initial excess returns was of some statistical significance. The intuition of these results is that the more ex-ante uncertainty that persists surrounding an issue then the greater the initial excess return can be expected to be. This results would seem to add credence to the asymmetric information work advanced by Rock to explain the phenomena.

Further work by Ritter in his 1984 paper revealed that a 'hot issue' market existed for new issues in which excess returns were significantly greater than the indicated 'normal' excess of around 10%. The evidence found also adds weight to the uncertainty related explanation. Ritter looked at a 15 month period between January 1980 and March 1981 and found an excess return of over forty eight percent. The reason for this was probably due to the large number of natural resource firms which floated in the period. Ritter argues that these firms, which have associated with them very high risk profiles, led to such anomalously high excess returns. He notes that underpricing is compensation to investors for the cost of becoming informed (by performing security analysis). Consequently, the greater the uncertainty surrounding an issue, the greater the required compensation to investors for the costs of becoming informed. Logically, therefore, high risk offerings should be underpriced more than low risk offerings. Indeed this is the intuition behind the Rock model. Further examination by Ritter revealed that there existed significant differences in the returns generated by these firms in 'hot' as opposed to 'cold' issue periods. Interestingly, Ritter found that while the returns of the 'hot' issue time frame IPOs were monotonic the were also highly non-stationary. Specifically, Ritter found that the returns of the high risk stocks were highly heteroscedastic. For other (i.e., non natural resource firms) significant differences in returns on 'hot' and 'cold' periods were not apparent. In essence the results of this study produce two insights. The existence of 'hot' issue markets is interesting. However, perhaps of more relevance is the support for the findings of Rock that ex-ante uncertainty and initial returns are positively related across issues. The reasons for the non stationary in the returns of the natural resource firms in the 'hot' period remain unexplained.

An interesting conclusion of the Ritter survey is that it would appear that firms can 'time' their flotations. The concept of relating ex-ante uncertainty to underpricing is further advanced by Beatty and Ritter[48] and by Miller and Reilly[49]. The proxy measures used in the Beatty and Ritter study were the number of uses of the funds to be raised as indicated in the prospectus document and the inverse of the gross proceeds of the issue. Both of these leading indicators were expected to be negatively related to the level of underpricing. This relation was found to hold.

[48] R. P. Beatty and J. Ritter, 'Investment Banking, Reputation and the Underpricing of Initial Public Offerings', Journal of Financial Economics, 15 1986

[49] R. E. Miller and F. K. Reilly, 'An Examination of Mispricing, Returns, Uncertainty for Initial Public Offerings', Financial Management Summer 1987

5.5.4 Underpricing as a Function of Auditor Quality

The perceived quality of the reporting accountants and/or the auditors of the firm to be floated may have some influence on the levels of underpricing of initial public offerings. The argument advanced by Titman and Trueman[50] suggests that higher quality auditors reveal more information than lower quality auditors and, accordingly, earn higher fees. On that basis higher quality auditors should mean that there is less ex-ante uncertainty over the prospects of the new issue. Accordingly, within the framework of Beatty and Ritter there should be an inverse relation between auditor quality and levels of underpricing and the levels of excess returns should be lower.

Simunic and Stein[51] provides some evidence that higher quality auditors advise larger, less risky, issues. They studied 490 IPOs in 1981 and used a regression model where a dummy variable coded for 'big 8' or 'non big 8' auditors was regressed against a number of explanatory variables using a cross sectional model. The dependent variable, as well as being positively related to the total assets of the issuing firm and negatively related to its leverage ratio, was also positively related to a dummy variable valued one for 'firm commitment' issues and zero for 'best efforts' deals, and to a dummy variable valued one for issues sponsored by 'major' investment bankers and zero otherwise. Given these results it appears that higher quality auditors tend to advise issues with lower ex-ante levels of uncertainty. An interesting feature of the work carried out by Simunic and Stein is the positive relation they revealed between auditor and sponsor reputations. This relationship is further analysed by Balvers at al[52] who looked at 1182 IPOs in the USA in the period 1981-1985. In this study the quality of the auditor was proxied by using a 'big-8/non big-8' dummy variable. The sponsor quality variable was determined using the

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[50] S. Titman and B. Trueman, 'Information Quality and the Valuation of New Issues' Journal of Accounting and Economics June 1986

[51] D. A. Simunic and M. Stein, 'Product Differentiation in Auditing: A Study of Auditor Effects in the Market for New Issues' University of British Columbia working paper 1985

[52] R. J. Balvers, W. McDonald and R. E. Miller, 'Underpricing of New Issues and the choice of Auditor as a Signal of Investment Banker Reputation', The Accounting Review October 1988

Hayes method[53] and the database was coded for sponsors falling into the 'bulge' and 'major' categories. To capture the effect of auditor and sponsor quality, the product of the binary quality variables described was formed. Regressing initial returns on the binary quality variables and the interaction variable revealed that the binary variable was insignificant and negative while the interaction term was significant and positive. The implication of these results is that as the quality of either the sponsor or the auditor increases, the impact of the other agent quality variables on the underpricing diminishes. This view was taken by Balvers et al. to support the view that the quality of the auditor's reputation helps to signal the quality of the sponsor to an issue. Therefore, controls for joint effects between the agents to IPOs should be made in empirical work to strip out the effect each may have on the other. Finally, more recent evidence of a significant inverse relation between auditor quality and levels of underpricing was found by Beatty[54] in his 1989 paper. He examined 2215 IPOs undertaken in the USA in the period from 1975-1984. He defined the initial return for a firm going public as the gross return to an investor who acquires a share and sells at the closing bid price at the close of the first day of dealings. For the sample indicated the excess return was 22.1%. He used the traditional methodology employing a multiple regression analysis with auditor quality as a dependent variable. While he found the general relation to hold he commended to the reader that there were implicit relationships between the risk classes of the potential IPOs and the 'quality' of the audit firms. i.e., the less risky firms were more likely to be audited by the larger accountancy firms (those with the most reputation capital at stake)

Work on auditor reputation has also been carried out in the UK. As with the studies carried out in the USA the notion of auditor reputation being used as a signalling variable is what practitioners test for. The status of the professional advisor to a flotation could influence the level of the IPO discount in two ways. The use of 'higher quality' advisors could reduce the owner's opportunity to cheat by providing

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[53] S. L. Hayes, 'Investment Banking: Power Structure in Flux', Harvard Business Review March-April 1971

[54] R. P. Beatty, 'Auditor Reputation and the Pricing of Initial Public Offerings', The Accounting Review October 1989

accurate information to the market. This sacrifice by the managers may be taken to mean that the owners have some favourable private information about the firm that they wish to reveal. Also, higher quality advisors with their relatively greater expertise may be able to forecast the market clearing price with greater accuracy than lower quality ones. In one UK based study Holland and Horton[55] examine a sample of 230 IPOs which floated in the period from 1986 to 1989 on the Unlisted Securities Market . They detected a significant relation between the level of the discount and the 'quality' of the audit firm. Higher quality audit firms were associated with lower levels of discount. This result is contra to that found by Keasey and McGuiness[56] in their 1991 paper and the results of Keasey and Short's 1992 paper[57]. Holland and Horton argue that it may be due to methodological issues that work previous to their own has failed to come up with any discernible difference. The authors do conclude in line with the previously aforementioned authors that there is no relationship between sponsor discount and the level of IPO outperformance.

Balvers, McDonald and Miller[58] introduce a model of the auditor reputation puzzle from the perspective of the investment banking sponsor where the reputation of the auditor effects the signalling environment. In their paper they concentrate on the interaction between the investment banker and the auditor. In practice they note that the sponsoring investment bank. frequently determines auditor selection either through tacit approval of the firm's existing auditor or by requesting auditor change. Both the issuing firm and the investment banker have a vested interest in the auditor selection decision. Indeed, the optimum choice of audit quality if management and underwriters were to select auditor independently, should be consistent between the two groups. The investment banker wanting to preserve its reputation capital prefers

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[55] K. M. Holland and J. G. Horton, 'Initial Public Offerings on the Unlisted Securities Market: The Impact of Professional Advisors', Accounting and Business Research Vol. 4 No. 93 1993 p19-34
[56] K. Keasey and P. McGuinness, 'An Empirical Investigation of the Role of Signalling in the Valuation of Unseasoned Equity Issues' Accounting and Business Research, 86 Spring p133-142
[57] K. Keasey and H. Short, ' The Underpricing of Initial Public Offerings: Some UK Evidence', Omega International Journal of Management Science, 20 p457 - 466
[58] R. J. Balvers, B. McDonald and R. E. Miller, 'Underpricing of New Issues and the Choice of Auditor as a Signal of Investment Banker Reputation', The Accounting Review Vol LXIII No. 4 198 p605 - 622

a high quality auditor to assimilate and verify financial information in the issuance process and thus prevent mispricing of the issue. Accordingly, the authors view the investment banker selecting the auditor and indirectly compensating the firm in part for the cost of hiring a high reputation auditor. The authors are not suggesting that investment bankers always select an issuing firm's auditor. The firm frequently has already made the choice and may well have their own agenda for making such a decision. However, the investment banker subsequently decides whether this auditor is acceptable for taking the firm public. Indeed Beatty, quotes from an A.I.C.P.A survey 'Almost universally, the reason expressed [for a change of auditor] was that the underwriters informed the client that a 'nationally known' firm was necessary to sell their offering at the highest possible price'. The authors differentiate audit services using the typical 'big 8 / non big 8' dependent variable to classify firms. The role of the audit firm in the authors model is based on the effect of auditor reputation on perceived investment banker reputation, and the ability of the auditor to effect ex ante uncertainty. The authors testes their theory on a sample of 1182 initial public offerings carried out in the USA by 118 sponsoring institutions. 'Big 8' auditors dominated the sample, accounting for 78% of the issues. The average level of underpricing for the 'big 8' IPOs was 7% versus 11% for the 'non big 8' IPOs. The authors evidence supported the four main hypotheses of their model, namely.

1) Investment bankers with higher reputation tend to be associated with high reputation auditors.

2) Investment bankers with high reputations underprice less.

3) The observed measure of auditor reputation helps reduce underpricing.

4) As both investment banker and auditor reputation increase, their impact on underpricing is reduced.

5.5.5 Uncertainty Revisited

In an extension of the 1986 paper, Beatty and Ritter offer a theory which suggests that sponsoring banks who fail to maintain the monotonic relationship between ex-ante uncertainty and the indicated excess return subsequently lose market share. In order to examine this 483 issues in the period 1977-1983 were examined, and the market shares of underwriting houses involved in four or more new issues over the period were calculated. Predicted initial returns were then computed for each firm (j) taken public by underwriter (i). These predicted returns were then compared to the actual return to give a residual return R(ij) for all issues. For each of the forty nine underwriters who fulfilled the criterion of having performed four IPOs in the time frame the average residual was computed. From these results standardised average residuals were then computed for each underwriter. Beatty and Ritter suggested that the twenty four with the largest standardised average returns were pricing 'off' the equilibrium line and the twenty five remaining on the line. For the twenty four pricing of the line Beatty and Ritter noted that their subsequent market share fell by forty seven percent between the two sub-periods (1/1977 - 3/1981 and 4/1981 - 12/1984). For the twenty five 'on the line' the percentage drop in market share was only twenty three percent. Given these finding Beatty and Ritter found that sponsoring banks have an incentive to enforce the equilibrium relationship between ex-ante uncertainty and levels of underpricing. A feature of the work carried out by Beatty and Ritter[59] is that differences in the quality of the sponsoring banks does not appear to be directly related to underpricing levels. Logically, banks with less 'reputation' capital to lose on 'cheating' according to the Rock model have less incentive to do so than the banks with higher levels of reputation capital. One method of cheating, as indicated by Baron, is for the sponsor to economise on distribution by deeply discounting the issue. Bearing in mind that the incentive to cheat is a decreasing function of sponsor prestige, levels of underpricing and sponsor reputation should be negatively correlated. Early evidence of differential pricing by sponsoring banks was first introduced by McDonald and Fisher[60]. Evidence was also

[59] Beatty and Ritter 1986 op. cit.

[60] J. G. McDonald and A. K. Fisher. 'New-Issue Stock Price Behaviour', Journal of Finance 27 1972

provided by Logue[61], Neuberger and Hammond[62], Neuberger and LaChapelle[63], Johnson and Miller[64] and Carter and Manster[65] who all found evidence of negative relations between sponsor quality and underpricing levels. However, Johnson and Miller[66] note that the negative association might reflect the fact that less prestigious underwriters sponsor issues where ex-ante levels of uncertainty are higher and as such require a higher degree of underpricing to compensate for this risk. As such, the less prestigious sponsoring banks are not so much violating the Beatty and Ritter[67] equilibrium as in fact enforcing it.

A further interpretation of the signalling type models discussed so far is provided by Jegadeesh, Weinstein and Welch[68]. They provide evidence to support the claim that firms deliberately underprice their IPOs to allow secondary equity offerings to proceed more easily. Recent signalling models, such as that proposed by Grinblatt and Hwang[69], present the following scenario surrounding signalling models. Typically, in models such as his, the firm raises capital through IPO and expects to raise additional funds in the aftermarket through seasoned equity offering (in the UK, rights issues). 'High-quality' firms underprice their offers more than 'low-quality' firms to increase investor affinity and make it easier for them to raise additional finance in the future. The price at which the 'high-quality' IPO expects to raise its secondary finance is strictly higher than if it did not participate in the signalling process with its IPO. The authors examine the relation between the returns around the initial public offerings of firms and their subsequent decisions to raise additional

[61] D. E. Logue, 'On the Pricing of Unseasoned Equity Issues: 1965 - 1969', Journal of Financial and Quantitative Analysis 8 1972

[62] B. M. Neurberger and C. T. Hammond, 'A Study of Underwriters' Experience with Unseasoned New Issues', Journal of Financial and Quantitative Analysis 1974

[63] B. M. Neuberger and C. A. LaChapelle, 'Unseasoned New Issue Price Performance on Three Tiers: 1975 - 1980', Financial Management Autumn 1983

[64] J. M. Johnson and R. E. Miller, 'Investment Banking Prestige and the Underpricing of Initial Public Offerings', Financial Management Summer 1988

[65] R. Carter and S. Manaster, 'Initial PublicOffering and Underwriter Reputation', Journal of Finance 45 1990

[66] J. M. Johnson and R. E. Miller 1988 op. cit.

[67] R. P. Beatty and J. R. Ritter 1986 op. cit.

[68] N. Jegadeesh, M. Weinstein and I. Welch, 'An empirical investigation of IPO returns and subsequent equity offerings', Journal of Financial Economics Vol 34 1993 p153 - 175

[69] M. Grinblatt and C. Hwang, 'Signalling and the Pricing of New Issues', Journal of Finance, June 1989 p393 - 420

capital through seasoned equity offerings. Under the signalling models we expect that firms with greater IPO underpricing are a) more likely to subsequently issue seasoned equity, b) likely to raise larger amounts of equity in their seasoned offerings, c) likely to offer seasoned equity more quickly after the IPO and d) likely to experience a smaller price drop when the seasoned equity offering is announced. Consistent with these predictions, the authors find that firms that underprice their IPO relatively more are more likely to issue seasoned equity, and on average to have larger seasoned offerings; in addition, these firms experience smaller price drops on the seasoned offering announcement dates. These relations, however, are rather weak from an economic perspective. For example 15.6% of the firms in the lowest IPO underpricing quintile (average underpricing of 6.4%) issue seasoned equity, whereas 23.9% of the firms in the largest underpricing quintile (average underpricing 42.9%) reissue equity. The lack of a strong association between IPO underpricing and subsequent seasoned equity offerings calls into question the explanatory power of the signalling hypothesis. Moreover, there are other explanations for these empirical irregularities. In fact, the results of these additional tests favour these alternatives. One alternative explanation that the authors consider is the 'market feedback' hypothesis. This position that the market is better informed than the issuer and hence a high return on the IPO date implies that the issuer has underestimated the marginal return to the project. The issuer uses this information and increases the scale of the project by raising additional capital through additional offerings. Alternatively, in the spirit of the 'pooling equilibrium' in Allen and Faulhaber, it is possible that all issuer types pool (or set the same IPO price) and the high quality firms issue seasoned equity if and when the market discovers their true quality.

To explore whether the observed relations between IPO returns and seasoned offering activity can be explained by market feedback and/or pooling hypotheses, the authors examine whether the returns in two twenty day trading periods immediately after the IPOs are related to subsequent equity offerings. Under the two alternative hypotheses it is postulated that the abnormal share price reaction during the immediate post-issue period to have the same effect on future equity issues as similar price changes on the issue date. Under the signalling hypothesis, in contrast, the return on the IPO date plays a unique role: the issuer signals its quality only through IPO underpricing. Therefore, under the signalling hypothesis we expect IPO underpricing to affect subsequent equity offered differently from the returns in the period immediately after the IPO date.

The authors find that firms with higher post-IPO abnormal returns are more likely to return to the seasoned equity market and to return with larger offerings. In fact, the point estimates indicate a stronger relation between the aftermarket return in either of the 20 day periods and in the likelihood of future seasoned offerings. Further, firms that experience higher returns in the aftermarket issue seasoned equity sooner. These results support the market feedback hypothesis, and suggest that the association between IPO underpricing and subsequent seasoned offerings is also related to these hypotheses.

5.5.6 Informational Cascades

An interesting adjunct to the literature on asymmetric information has been provided by Ivo Welch[70]. He introduces the concept of informational 'cascades'. Here, investors do not follow a course of action predicated by their own private information so much as they act having observed the actions of those around them.

Welch introduces a situation in which an issuer is selling a new security of uncertain value. While the value of the new security is highly uncertain to individual investors, investors hold perfectly accurate information when aggregated. Moreover, there are a number of potential investors and a small number of these investors can jointly determine the value of the firm with high precision. In such an environment it would seem that in this scenario, underpriced offerings would succeed and overpriced offering would fail.

However, the Welch paper shows that, if the distribution channels of investment banks are limited (as they are), underpriced offerings can fail and overpriced offerings can succeed. With limited distribution channels, it takes the underwriter time to approach interested investors. Therefore, later investors can observe how well an offering has sold to date, or at least how successful it has sold relative to offerings previously undertaken by this underwriter. Hence, investors approached after some time can infer information from investors who were approached earlier. An individual investor can interpret a successful initial sales effort to imply that earlier investors had favourable information about an offering, in turn giving the later investor additional incentive to invest. Analogously, slow initial sales discourage subsequent investing. The conditioning of information on the decisions of earlier investors is a positive informational externality.

As a result, offering proceeds depend on the ordering of information among investors. Holding aggregate information constant, if earlier investors are more inclined to invest then the issuer will receive more proceeds.

The inferred value would converge to the true value if investors could observe the signals held by those investors approached earlier. However, it is not realistic to

[70] I. Welch, 'Sequential Sales, Learning and Cascades', Journal of Finance, Vol XLVII No. 2 June 1992 p695-732

assume that investors can observe these signals. They can only observe and believe earlier investors actions from early sales. Then an investor who has observed previously high or previously low demand will rapidly base his decision to purchase exclusively on earlier sales and ignore his private information. Given that the individual finds it in his own best interests to ignore private information and relies on the information inferred from the actions of previous investors in framing his own purchasing decision, all subsequent investors will face the same decision and will act alike.

As a consequence, if a few early investors believe that an offer is overpriced than they can swamp the information held by all other investors and more or less doom the offering to failure. Or, if a few early investors think the offer a bargain, they can create almost unlimited demand for the issue.

The essence of his argument is that the value of a new security is highly uncertain to individual market participants but all the market players together hold perfect information when aggregated. Also, there are many potential investors and a relatively small number of them acting together can determine the value of a firm with some accuracy.

With such limited distribution channels, it takes time for the underwriter to approach potential investors. Therefore the later investors can observe how well an offering has sold to date - or at least gauge its relative success. Hence, investors approached after some time can gauge from the reaction of those investors who were approached earlier what the view of the new investment opportunity is. The individual can interpret a successful initial sales effort to imply investors had positive information about the firm, giving the later investor additional incentive to invest.

A good example of this phenomenon is given by Welch. He quotes a story from Fortune Magazine[71] relating to the IPO of Microsoft where the underwriting

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[71] B. Uttal, 'Inside the Deal that made Bill Gates $350,000000', Fortune Magazine, July 21 1986 p32

institution was obviously aware of the effect of price on the likely initial success of the IPO. Quoting from the text..

'..Eric Dobkin, 43, the partner in charge of common stock offerings at Goldman Sachs felt uneasy about Microsoft's counterproposal (to increase the offering price). For a hour he tussled with Gaudette (Microsoft's representative), using every argument he could muster. Coming out $1 to high would drive off some high quality investors. Just a few significant defection could lead to the offer losing its lustre.'

From this we can see that the underwriter, in this case Goldman Sachs was very aware of the effect of a potential 'cascade'.

There are many similar stories in a UK context. One in particular relates to the IPO of the House of Fraser retail store chain. In that issue the sponsors S. G. Warburg were so concerned with the potential effects of the success of the float and the associated effects failure would have on their reputation capital that when confronted with an ultimatum from the vendors of the business to raise the float price they threatened to pull the flotation twenty four hours before impact day.

5.5.7 Excess Returns as a Function of Speculative Bubbles

Perhaps the most basic explanation of the underpricing of IPOs is that excess returns are created as a function of 'speculative' bubbles in the market during the early period of trading in the IPO shares[72]. A 'bubbles' phenomena would suggest that stock prices are temporarily overvalued as irrational investors bid up the market prices for the stocks over and above the value represented by the discrete businesses themselves. Within the context of this review a 'speculative' bubble may emerge in secondary market trading as the market exaggerated the required price needed to compensate for the perceived level of underpricing. Over-optimistic buying may also emerge in response to an issue being oversubscribed (and hence rationed) prior to trading so that when trading commences there is a demand from investors who were unsatisfied by their allocation in the float. This has a necessarily upward effect on the stock price. (This speculative response to the initial rationing of shares was outlined in Shiller[73] in the form of a 'shortage illusion' hypothesis). Eventually, however, the speculative bubble must burst as market efficiency causes stock prices to adjust downwards to their true 'intrinsic' value. Further work on this phenomenon has been carried out by Miller in his 1987 paper[74] . He argues that if a minority of optimistic potential investors can absorb the finite supply of share in an offer then stock prices may be inflated in the initial offer period. Miller demonstrates that this effect will be more pronounced the greater is the divergence of investor opinion with regard to stock prices. However, investor opinion should converge as progress is made through the post listing period given the gradual dissemination of information relevant to stock value. This, in turn, causes prices to adjust downwards towards their intrinsic value. Given the scenario outlined the speculative trends as described require a period of rising prices in the immediate post issue period followed by a reversal later in the post issue period. This pattern has been observed by a number of studies including those carried out by Bear and Curley[75], Aggarwal and Rivoli[76] and Ritter[77].

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[72] For further explanation of the 'bubbles' phenomenon see Schiller (90) and Stiglitz(90)

[73] R. J. Shiller, 'Speculative Prices and Popular Models', Journal of Economic Perspectives 4 1990

[74] R.E Miller and F.K. Reilly, 'An Examination of Mis-Pricing, Returns, Uncertainty for Initial Public Offerings' Financial Management Summer 1987

[75] R. M. Bear and A. J. Curley, 'Unseasoned Equity Financing', Journal of Financial and Quantitative Analysis 10 1975

In Aggarwal and Rivoli the empirics they present support the hypothesis of the 'bubble bursting' in the context of the US market. They find evidence that the bubbles burst between five and twelve months after listing. More importantly, investors who buy stocks after the reaction to the initial underpricing are likely to experience negative returns as investors revise stock prices downwards in the aftermarket. Ritter notes a similar pattern of post listing price behaviour but he postulates that the observed negative trend in price performance in the aftermarket is due to investors periodically over-estimating the earnings potential of small high-growth companies and that firms take advantage of such opportunities to time their moves onto the market. Eventually, the necessary correction of this exuberant pricing produces a downward move in stock prices. This set of arguments mirrors closely Ritter's 1984 paper in which he introduces the concept of 'Hot Issue' markets where over certain periods initial returns are highly non-stationary. Ritter notes that in the 15 month period commencing in January 1980 the mean return on initial public offerings was a staggering 48.4%. This compared to a mean return of 16.3% during the remainder of the 6 year period 1977 - 1982. This 'hot issue' market was a strange, but not unique, phenomenon. Ritter tries to explain away this event along the lines of Rock. In that model some types of unseasoned new issues are underpriced far more than 'normal', namely the highly risky ones.

Aggarwal and Rivoli offer a different explanation of the speculative effect. They theorise that sponsors attempt to place the issue among 'safe hands' who are unlikely to 'stag' the issue rather than those who might trade in the stock in the immediate after-market and hence create volume induced volatility. As such, if the sponsors are able to identify 'strong hands' then the supply of stock to those individuals who were rationed in their holdings when allocations were made (and are as such natural buyers of the stock) will be reduced and the price will be bid up by the aggressive buying from rationed institutions. The scenario outlined in not dissimilar to that put forward

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[76] R. Aggarwal and P. Rivoli, 'Fads in the Initial Public Offering Market' Financial Management 19 Winter 1990

[77] J. R. Ritter, 'The Long Run Performance of Initial Public Offerings', Journal of Finance March 1991

by Ritter in his 1984[78] paper and by Shea Tinic in his 1988[79] paper. These papers introduce the concept of 'monopsony power' where large, reputable sponsors exercise power in the pricing of small speculative issues. By exploiting the 'power' they have the large sponsoring banks can over allocate to their favoured clients who then reward the sponsor in some indirect manner (e.g., by providing the sponsor with more commissioned business) One can draw a connection between the 'monopsony power' theory and the argument offered by Aggarwal and Rivoli. It could be that the favoured customers of the sponsoring bank provide 'safe hands' in the Aggarwal and Rivoli model by retaining equity in the immediate after-market. While intuitively appealing, this argument loses some of its practical applicability as in the US market there is the opportunity for the investment banker to pre-sell equity to selected customers. In the UK market the procedure is not the same. The requirement is for an equitable allocation of equity. While there is a considerable body of evidence presented to back-up the 'speculative' bubble argument there is an equally compelling body of evidence which stands against the theory. There are a number of studies which indicate relatively efficient pricing of equities in the aftermarket. e.g., Ibbotson[80], Block and Stanley[81] and Dawson[82]. These studies provide evidence that the market quickly eliminates any excess returns from initial underpricing so that systematic excess returns are unachievable in the secondary market (adjusting for he risks of IPO companies). Furthermore the body of evidence indicates that the returns from any initial underpricing are independent of subsequent returns. Given this picture, underpricing arises simply as a function of downward bias in the pricing of unseasoned new issues. Finally, it the efficient market explanation for underpricing can be accepted, one can explain the underpricing in terms of the initial mis-pricing

[78] Ritter 1984 op. cit.

[79] Tinic 1988 op. cit.

[80] R. G. Ibbotson, 'Price Performance of Common Stock New Issues', Journal of Financial Economics 3 1975

[81] S. Block and M. Stanley, 'The Financial Characteristics and Price Movement Patterns of Companies Approaching the Unseasoned Securities Market in the Late 70's', Financial Management Winter 1980

[82] S. M. Dawson' Secondary Stock Market Performance of Initial Public Offers, Hong Kong, Singapore and Malaysia: 1978-1984', Journal of Business Finance and Accounting 14(1) 1987

of the IPO firm in the context of informational asymmetries in the context of the models of Baron and Rock.

5.5.8 Excess Returns from 'Stabilisation'

Nearly all of the empirical studies outlined provide evidence that IPOs are underpriced and provide abnormal returns to investors in the immediate post-issue period. It would appear that firms 'leave money on the table' in significant amounts. While this is quite satisfactory from the point of view of investors, it is far from ideal from the point of view of the small, growing firms raising the funding.

In contrast to the majority of the studies already discussed there may be another explanation of the observed underpricing in which neither the issuer nor the sponsor deliberately underprices the offering and the flotation price does reflect the true intrinsic value of the firm. This is often referred to as 'stabilisation'.

What is 'Stabilisation?'

Stabilisation attempts to smooth, mitigate or even avoid short run share price declines. The underwriter of the offering may indeed believe that stabilisation in the first few days of trading can avert or mitigate price declines indefinitely, particularly if there is particularly heavy selling in the immediate post issue period.

Since information of stabilising activities is not directly observable, authors such as Schultz and Zaman[83] and Ruud[84], examine the effect of 'stabilisation' using indirect measures. They use their inferences on the behaviour of the variables they monitor to test for the presence of 'stabilisation'. A number of authors including the aforementioned, argue that stabilisation truncates the distribution of post offering stock returns in the short run. In other studies, the authors investigate the presence of stabilisation by examining the effect of this distributional truncation on the bid-ask spread.

To deal with the last point firstly, numerous studies, including Copeland and Galai[85] demonstrate that the width of a bid-offer spread for a stock is at least partially

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[83] P. H. Shultz and M. A. Zarman, 'Aftermarket Support of Initial Public Offerings', Journal of Financial Economics 35 1994

[84] J. S. Ruud, 'Underwriter price support and the IPO underpricing puzzle', Journal of Financial Economics 34 1993

[85] T. Copeland and D. Galai, 'The Informational Effects of the bid-ask spread', Journal of Finance Vol 38 1983 p1457 - 1469

determined by the volatility of the underlying stock price process. One explanation for this relation is the 'inventory cost' explanation. Dealers who post firm bid-ask quotes buy at the bid and sell at the ask. Subsequent price moves expose dealers to two types of losses.

First, if the price subsequently increases, dealers suffer opportunity losses by selling at an ask which subsequently turns out to be too low. Second, and of greater importance to the authors' study, if the price subsequently decreases, the dealers' inventory of shares declines in value thereby crystallising a capital loss. 'Stabilising' activities reduce the second cost. If dealers believe that, at least in the short run, stabilising activities will prevent the market price from falling below some floor price, then inventory losses from price declines will be mitigated. For example assume that a dealer posts a bid price of 200p, believing that there is floor price of 180p at which the stabiliser is willing to buy stock for the potential seller. In such a scenario, the maximum loss the dealer believes he will incur on the shares purchased at his quoted bid is 20p. Assuming that the dealer is market competitive, this reduction in potential losses will be reflected in the cost of providing liquidity services, i.e., the bid-offer spread will narrow. The value of this truncated loss depends on a number of factors. One important factor is the difference between the posted quote price and the floor price, which represent the maximum possible inventory loss. As this difference narrows, inventory losses are reduced, as are the costs of providing liquidity services. Therefore, holding all other factors constant, there should be a positive relation between the width of the quoted bid-ask spread and the distance between the current posted quotes and the floor price.

Stabilisation is capital intensive and moreover, stabilising activities must, by law[86], be terminated once the distribution of securities is complete. Stabilisation, therefore should last for only a short time. Hence the positive relation between the width of the quoted bid-offer spread and the distance between the current posted quotes and the

[86] In the United States

floor price, as well as the negative relation between the width of the quoted bid-offer spread and the value of the put option written by the stabiliser, should decay over time. Finally, stabilisation is effectively a legal form of price manipulation. Therefore, ending such activities allows the unobstructed forces of supply and demand to dictate fair market prices. Since stabilisation only exists to retard price declines, those issues which have not been stabilised should experience observable price declines once stabilisation is discontinued. Note, however, that in order to observe post stabilisation price decline the value of the stabilisers bid must exceed the intrinsic value of the security when stabilisation ends.

Shultz and Zaman[87] view stabilisation as a complement to underpricing. The reasons for maintaining an aftermarket price at or above an offer price can be the same as those for originally setting a price below the initial aftermarket price.
Some buyers of the IPO will renege if the issue is overpriced. If the aftermarket price is less than the offer price, or if it appears that the underwriter is having trouble selling the issue, investors who have placed non binding indications of interest would rationally decline to purchase shares in the initial offering and would instead buy stock in the aftermarket. In addition, even if an investor confirms a buy order when the offering becomes effective, they can renege without penalty for five business days. If aftermarket support is perceived as effecting a permanent increase in price by reducing supply, investors will not see an advantage in waiting to purchase an IPO in the aftermarket and will be less likely to renege.
The option to cancel an indication of interest or renege on an order leads to underpricing under some circumstances. An IPO investor effectively has a Put option to sell stock back to the underwriter for the issue price by declining to take up shares after placing an indication of interest or by reneging on an order. Underwriters must be compensated for the provision of such Puts, in addition to the other services. However, in the US, State limits on underwriting commissions are 10-15% so it may

[87] P. H. Schultz and M. A. Zaman, ibid

be necessary to underprice IPOs to lower the implicit exercise price and minimise the value of the Put written to IPO purchasers.

In addition, the costs of re-selling an issue after investors have reneged can be minimised by underpricing. If these costs are large enough, it will be cheaper to reduce the value of the Put and the costs of reselling the reneged shares by underpricing than to explicitly compensate the underwriter for writing the Put.

Aftermarket support prevents cascades. Welsh argues that potential purchasers of IPOs use their knowledge of whether other investors participate to make their own investment decisions. If sales take place sequentially, then a long enough tail of investors who don't go for an IPO will induce the tail to forgo the IPO. On this basis an IPO can fail, even if its fairly priced. In practice, investors who are asked to confirm indications of interest in firm commitment offerings can observe the reaction of previously approached buyers through the movements of the aftermarket price. If the aftermarket price is not over the offer price then the investors can infer than the investors had negative information about the stock and can renege on their purchase. By supporting the stock in the aftermarket, the underwriter may be able to prevent a cascade form happening if investors who are first approached to buy the issue pass on the issue. Similarly, the potential for cascades provides an incentive to underprice an issue to ensure that a run of investors who pass on an offer does not develop in the first place.

Schultz and Zaman[88] distinguish between two different methods of supporting an IPO in the aftermarket. Underwriters can either bring about a permanent change in the stock price by reducing the supply of stock or temporarily prop up the price by buying stock later for resale.

The two techniques of aftermarket support, stabilisation and reducing the supply of shares in the aftermarket, both imply that underwriters will quote at the inside bid more often than at the inside ask, particularly if the IPO is 'cold'.

[88] P. H. Schultz and M. A. Zaman, ibid

Also, both methods suggest that there should be a disproportionate amount of selling of cold IPOs when underwriters quote prices which are too high to equate supply and demand. Additional implications of the hypothesis that underwriters restrict supply in the aftermarket are that they repurchase large quantities of stock when the aftermarket price is below the offer price and that they exercise over-allotment options if the stock trades at higher prices than the offering price.

Evidence on the Existence of Stabilisation

Clear evidence of this phenomenon was put forward by Ruud[89] in her 1993 paper where she introduces the concept of 'stabilisation' as an explanation of the excess abnormal returns made by IPOs. Due to the difficulties in studying the phenomenon directly, her study examines not only the mean level of initial returns made by IPOs but also the distribution of these returns. The findings of the study are that instead of forming a symmetric curve, the distribution of one day returns is found to peak sharply at zero and include very few observations in the negative left hand tail. In contrast with the view that IPO underpricing is undertaken deliberately, the findings presented here suggest that the apparent underpricing may be attributed to underwriter price support.

When prices are subject to support in the aftermarket, observations which would normally appear in the negative left hand tail of the distribution may be 'propped up' to zero or slightly negative by a standing purchase order put on by the sponsor at the offer price. As already indicated, researchers have in the main ignored the impact stabilisation could have on IPO returns to date. Such support is legal (in the USA) under the stipulations of the Securities Act of 1934. The effects of stabilisation would be to reduce the number of negative initial returns that would be observed in normal market trading. This 'censoring' of the negative tail of the distribution of returns could produce a positive mean initial return even if issue prices were set at the true intrinsic value.

[89] J. S. Ruud, ibid

As mentioned , underwriter price support involves transactions that prevent or retard a decline in the market price of a security and is intended to facilitate a distribution. In the US, as in the UK, the relevant authorities tend to frown upon price manipulation. However, on both sides of the Atlantic it is allowed. The SEC justify it on the grounds that it mitigates underwriter losses stemming from temporary downward pressure during the selling period[90]. The London Stock Exchange also permits it, requiring only that an announcement be made each day by the company concerned to the fact that 'stabilising' transactions are taking place.

Although supporting prices may tie underwriter's capital in the short run, it has been suggested that the practice enhances underwriters' reputations with issuers and investors. The SEC has taken the position that stabilisation is not manipulative so long as the possibility of stabilisation is included in the offering documents.

Statistical analysis provides a means of evaluating whether IPO underpricing is a deliberate strategy or a consequence of support activities undertaken by underwriters. If IPO underpricing were undertaken across the board on a deliberate basis then the distribution of returns (one-day) would be roughly bell-shaped with the peak of the distribution centred some way greater than zero. However, Ruud finds that few IPOs fall below their offered price immediately and instead of the bell-shaped curve which we would expect, Ruud found that the distribution of returns peaks steeply at zero and that the left hand (negative) tail of the distribution declines sharply. This observed distribution is symptomatic of support. The consequences of support would be for the number of negative returns to be very few (as sponsors support the prices) and for those which would perhaps have produced a negative return to be propped up to near zero, hence producing the spike in the distribution at zero. The statistical term for the phenomenon described is 'censoring'. A sample is said to be censored if there is some threshold level above which actual values are not observed, it is only known that the true value lies above the observed levels. In the case of IPOs, the censoring level is a return of zero. Initial returns of zero are observed in instances where returns less than zero would have been observed in the absence of support. In this way

[90] Securities Exchange Act Release No. 2446 March 18 1940

systematic support allows the right tail (positive returns) to be observed, but not the left tail. The censoring of the left tail could produce a positive mean initial return even if the IPO offering prices were set at true 'intrinsic' value.

Ruud examined 469 IPOs in the 1982/83 period and specifically looked at returns over one day, one week, two weeks, three weeks and four weeks. Using the statistical measure of skewness, kurtosis, she found that the distribution of returns was indeed skewed in the way in which she postulated and that the level of skewness declined over the time periods outlined. This is symptomatic of price support taking place and then being slowly withdrawn as time passes. Ruud then goes on to try to correct for the effects of skewness on the returns observed. The idea here was to provide a measure of the level of excess returns generated net of the effects of stabilisation. When this exercise was performed the one day return fell from 6.4% to 1.5%, not enough to allow a profitable trading strategy net of transactions costs. In summary, Ruud's evidence points to stabilisation producing excess returns in otherwise correctly priced issues[91].

However, it should be said that there is evidence which undermines to a degree the strength of the findings put forward by Ruud. There are two aspects of her work which have caused a degree of disquiet. The first relates to the fact that she chose to use log returns when examining the return distribution. Taking logs has an effect on the distribution and commentators have voiced concern over the impact of this on the strength of the inference which can be made from the results. The second issue relates to the final part of Ruud's analysis where she concludes that, net of the effect of stabilisation, there is no excess returns to be gained from investing in IPOs.

Evidence contra to that advanced by Ruud was in fact introduced by Miller and Reilly in 1987[92]. Using a sample of 510 firms covering almost the identical period to the Ruud study they report that 30% of their sample had non-positive market adjusted day one returns. These issues underperformed by an average of 3.9% during the next four weeks whereas the other 70% of issues outperformed the market by 1%

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[91] P. H. Shultz and M. A. Zarman, ibid

[92] R. Miller and F. Reilly, 'An examination of mis-pricing, returns, and uncertainty for initial public offerings' Financial Management Vol 16 1987 p33 - 38

over the same time period. Given that the average initial return for their sample was 9.9%, they concluded that the effect of the stabilising activities was to decrease the average initial return to 9% at worst, clearly leaving a 'tradable' abnormal return for investors to exploit.

Earlier in this section some of the testable implications of 'stabilisation' were introduced. The results of the tests conducted by Shultz and Zaman are now reported. This study examines the aftermarket transactions from the first three days of trading, along with quotes of underwriters and other market makers, and find direct evidence that underwriters support IPOs in the aftermarket.

This finding is important for two reasons. First, it provides indirect evidence on why IPOs are underpriced. Second, it allows a fuller characterisation of the role of underwriters in the IPO process.

Their sample consists of every trade and every quote update for the first three days of trading for 72 IPOs from 31/3/92 to 1/6/92. This intra-day data allows them to determine how much of the volume can be attributed to buys, how much to sells and how trading patterns move over the first three days of trading.

To compare underwriter behaviour across IPOs that are more or less likely to be supported, the sample is split at each point in time into IPOs which trade above their offering price (hot) and those which trade below (cold). By this definition an IPO can change from hot to cold if the stock price drops from above the offer price to at price at or below the offer price in the aftermarket.

Consistent with aftermarket support the authors find that the underwriters spend a larger proportion of their time at the inside bid (the highest price any dealer will pay for stock) for cold IPOs than they do for cold IPOs. Other market makers spend a significantly smaller proportion of their time so doing. When the inside quotes are recalculated after omitting underwriter quotes, they find that average inside bids are usually lower, particularly for cold IPOs. Inside ask quotes are generally the same either with the inclusion of underwriters or without.

They also split the sample of IPOs into those with positive initial returns and those with zero or negative initial returns to examine the time-series behaviour of IPOs and the aggregate buying and selling of underwriters. This analysis provides further evidence of aftermarket support. A greater proportion of aftermarket volume is from sell orders from fully priced IPOs than for underpriced IPOs. Underwriters appear to take the opposite side of these trades and on average to repurchase large quantities of stock.

Hanley et al provide another useful survey. Their sample consists of some 2758 firm commitment IPOs undertaken in the US on the NASDAQ market in the period January 1982 to September 1987. The authors model the effect of stabilisation on bid-offer spreads using a method which allows for variation over time in this variable. Since they hypothesise that the duration and intensity of stabilisation activities will decay over time, they compute cross sectional regressions for each day for days 1 to 30 in the aftermarket trading period, using the relative bid-offer spread as the dependent variable and factors known to affect the bid-offer spread as independent variables. The authors estimate 30 separate cross-sectional regressions (one for each of the 30 event days) of the form:

$$\ln(\text{Relative Spread}_{jt}) = \alpha + \beta 1_t \ln(\text{volume}_{jt}) + \beta 2_t \ln(\text{No. of mkt. makers}_{jt}) + \beta 3_t \ln(\text{price}_{jt}) + \beta 4_t \ln(\text{volatility}_{jt}) + \beta 5_t \ln(\text{stabilisation proxy}_{jt})$$

The first measure of potential stabilisation which the authors focus upon is the log of the ratio of the closing bid price to the offer price, or the nearness of the market price to the 'floor' price. When this measure is large and positive, the current market price is above the hypothesised floor price and the associated reduction in inventory losses attributable to stabilisation is small. As the ratio approaches zero or turns negative, however, the floor price becomes a more relevant boundary and the spreads should narrow. Consequently, the authors examine the behaviour of $\beta 5_t$, the estimate of the effect of ln(bid price/offer price) on quoted spreads. If price stabilisation exists and effects the bid-offer spread, then we expect the $\beta 5_t$ estimate should be positive and that any significance in the relation should diminish over time.

Consistent with the hypothesis, the authors find that $\beta 5_t$ estimates are positive and significantly related to bid-offer spreads for the first ten days of trading after controlling for volume, the number of market makers, the mid point of the bid-offer spreads and volatility. Since the model specification is log-log, coefficient estimates are unit free and can be interpreted as elasticities. Consequently, the magnitudes of the coefficients are related to he relative economic importance of the independent variables. The authors find that the largest elasticity over the first few days is associated with the stabilisation variable. These results are uniformly consistent with the propositions that the relation between the width of the posted bid-offer spread and the distance between the posted quotes and the floor price is significantly positive and this relation decays by day 10 of the aftermatket period.

The second testable implication of the hypothesis is that the effect of a stabilising bid on dealer's losses can be modelled as a 'put' option. In other words, the presence of price stabilisation effectively truncates dealers' potential downside losses from adverse price movements. For each firm on each event date, put option values are calculated and then used as proxies for stabilisation in the cross-sectional regressions. Since these 'puts' are written by the stabiliser and held by the remaining dealers, spreads should narrow as the option value increases. Consequently, if price stabilisation exists and affects the bid-offer spread, the authors predict that the $\beta 5_t$ estimates should be negative immediately after the offer and should diminish in event time. The authors find that the estimates are negative and significant over the first 10 event days with the exception of day 7. Therefore, spreads are significantly related to the value of the put option written by the stabiliser, conditional on volume, the number of market makers, the price level and variance.

Finally, the authors examine returns following the hypothesised end of stabilisation to determine whether the removal of stabilisation leads to immediate price declines. The authors follow this course for two reasons. Firstly, return based evidence consistent with stabilisation complements the spread results and increases the likelihood that the spread results are due to stabilisation. Secondly, though numerous studies examine the returns for various IPO based investment strategies, few explicitly recognise the potential impact of stabilisation.

Since we cannot determine exactly when stabilisation ceases for each offer the authors perform two tests based on different assumptions about when the stabilisation ends. In the first test the authors assume that stabilising activities cease after event day 10. If stabilisation is successful in maintaining prices above their intrinsic value, then price declines should, on average, occur after the end of stabilisation, and such declines should occur only for those firms most likely to have been exposed to stabilisation. The results for the first test are consistent with process for the stabilised issues being maintained above their equilibrium value.
In the second test, the authors allow stabilisation to end at any time in the first 15 days of aftermarket trading. However, they assume that stabilisation only occurs at the offer price. Therefore, observing a closing bid price below a closing offer price is taken as evidence that stabilisation activities are terminated. Splitting that sample into two groups representing those where stabilisation is hypothesised to have taken place and those where it is not, the results show that the issues hypothesised to have been stabilised show significant negative returns in the five days after stabilising activities are posited to have ended.
Establishing that stabilisation is common in the after issue market for IPOs is important from a public policy perspective. Investors who engage in what they believe are open market transactions at prices determined by the freely acting forces of supply and demand may find instead that they have purchased shares at artificially inflated prices and suffer subsequent losses.

Further work on price stabilisation in the IPO market has been undertaken by Weiss Hanley, Kumar and Seguin[93]. Using a sample of some 1523 NASDAQ listed IPOs listing between 1982 and 1987 they found that the bid - offer spread narrowed when the market price was close to the offer price. In addition they found that significant negative returns accrued at the time when stabilising activities are hypothesised to come to an end. The authors provide a useful definition of 'stabilisation'. The quote the 1940 Securities and Exchange Commission release which defines stabilisation as

[93] K. Weiss Hanley, A. A. Kumar and P. J. Seguin, 'Price Stabilisation in the market for new issues', Journal of Financial Economics Vol 34 1993 p177 - 197

'..the buying of a security for the limited purpose of preventing or retarding a decline in its open market price in order to facilitate its distribution to the public.' To absorb open market selling and to prevent a drop in market prices, the underwriter of an offer enters a 'syndicate bid', usually at the issue price. If selling pressure is large enough to preclude buying the securities at the issue price, the underwriter may either decrease its bid to successively lower levels or cease its efforts at stabilisation altogether. Given that such activities are 'capital intensive' and their duration is governed by regulation, the underwriter can engage in stabilisation only for a short period of time. The actual stabilising purchases in the study undertaken by the authors are unobservable. However, the authors provide indirect evidence of stabilising activities through the size of the bid-ask spread. The authors hypothesise that the bid-ask spreads are smaller for issues hypothesised to be most effected by stabilisation. Furthermore, stabilised offers decline in value following cessation of stabilisation.

Although information on the timing or amount of stabilising purchases has never been reported to the S.E.C. in the U.S.A. , managing underwriters were required to inform the S.E.C. if they engaged in stabilising activities. Stoll[94] and Hess and Frost[95] use this information to examine the influence of stabilisation on returns. Stoll finds that, for a sample of 50 new equity issues, the stabilised issues underperform the non-stabilised issues by 4.2% over the first ten days of trading. However, this difference is insignificant. He concludes the '...stabilisation appears to occur in response to falling prices and presumably make one wonder why it is engaged in.' It would seem then that while the phenomenon exists, it is hard to rationalise.

[94] H. R. Stoll, 'The pricing of underwritten offerings of listed common stocks and the compensation of underwriters', Journal of Financial Economics Vol 28 1976 p96 - 103
[95] A. Hess and P. A. Frost, 'Test for the price effects of new issues of seasoned securities', Journal of Finance Vol 37 1982 p11 - 26

5.5.10 Long Term Performance of Initial Public Offerings

While not specifically an area of direct relevance to this study the subject of the long-run performance of IPOs is extremely interesting and is included in this literature review for completeness.

Jay Ritter, in his 1991 paper[96], introduces strong evidence to suggest that while IPOs in general produce average excess returns in the short term (see Chapter One for some detail) they underperform a matched sample of seasoned firms on a three year view. Ritter finds this to be true for his sample of some 1526 IPOs which went public in the USA in the 1975-1984 period.

There are several reasons why the long run underperformance of IPOs is of interest. Firstly, from an investors viewpoint, the existence of price patterns may present opportunities for active trading strategies to produce superior returns. Secondly, a finding of non zero aftermarket performance calls into question the informational efficiency of the IPO market. It also provides evidence on the existence of 'fads' Thirdly, the volume of IPOs displays large variations over time. If high volume periods are associated with poor long run performance, this would indicate that issuers are successfully timing new issues to take advantage of 'windows of opportunity'. Fourthly, the cost of external equity capital for companies going public depends not only on the transaction costs incurred in going public but on the returns investors receive in the aftermarket. To the degree that low returns are earned in the aftermarket, the cost of equity capital is lowered for these firms.

To summarise the empirical finding of this paper, the average holding period return for a sample of 1526 IPOs of common stock in the 1975-1984 period is 34.47% in the 3 years after going public, where this holding period return is measured from the closing aftermarket price on the first day of dealings to the market price on the third year anniversary. Ritter's control sample of firms matched by industry and size produces a total return of 61.86% over the same holding period.

Possible explanations of the anomaly are 1) risk mis-measurement, 2) bad luck or 3) fads and over-optimism. To ascertain whether risk mis measurement could be an

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[96] J. Ritter, 'The Long Run Performance of Initial Public Offerings', Journal of Finance, Vol XLVL No. 1 March 1991 p 3 - 27

explanation for the phenomenon, alternative benchmark portfolios are used. To distinguish between the bad luck explanation and the fads and over-optimism explanation, various cross-sectional and time series patterns are documented. The pattern that emerges is that underperformance is concentrated among relatively young, high growth companies, especially those which went public in the high growth years of the eighties. While this pattern does not rule out bad luck being the cause of the underperformance, it is wholly consistent with a scenario where firms go public when investors are irrationally overoptimistic about the future potential of certain industries, which following Schiller, Ritter refers to as the 'fads' explanation. Further support for this explanation is found in Lee, Shleifer and Thaler[97] who find that the annual number of operating companies going public in the 1966-1985 period is strongly negatively related to the discount on closed end mutual funds, which they interpret as a measure of individual investor sentiment.

At least three published academic articles plus a series of articles in Forbes magazine have examined the long run performance of IPOs. Stoll and Curley[98] used a sample of 205 small offerings and found that '..in the short run, the stocks in the sample showed remarkable price appreciation...In the long run, investors in small firms did not fare so well...'(p314-315)

The initial work on the subject of long run underperformance was undertaken by Roger Ibbotson[99]. Ibbotson, using one offering per month for the 10 year period 1960-1969, computed excess returns on IPOs with an offer price of at least $3.00 per share. He concludes that the results 'generally confirm that there are no departures from market efficiency in the aftermarket'(p265). However, he does find evidence that there is 'generally positive performance in the first year, negative performance in the next three years and positive performance in the fifth year.'(p252), although the standard errors of his test statistics are such as to make rejection of the null hypothesis that the market is efficient difficult.

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[97] C. Lee, A. Scleifer and R. Thaler, 'Investor sentiment and the close end fund puzzle', Journal of Finance, Vol 46 1991 p75-109

[98] H. R. Stoll and A. J. Curley, 'Small businesses and the new issues market for equities', Journal of Financial and Quantitative Analysis, Vol 5 1970 p 309 - 322

[99] R. G. Ibbotson, 'Price performance of common stock new issues', Journal of Financial Economics, Vol 3 1975 p235-272

Buser and Chan[100] evaluate the two year performance of over 1078 IPOs on NASDAQ in the 1981-1985 period. Their sample has an initial positive return of some 6.2% and a mean 2 year market adjusted return of 11.2%. Their study does not find evidence of a negative after market performance from investments made in IPOs.

Ritter finds in his study that the long run underperformance of IPOs is significant at an economic and statistical level. He finds 31 of the 36 monthly adjusted returns to be negative, with 13 t-statistics greater than -2. Later in his paper Ritter examines the relation between gross offer proceeds and underperformance. His results are tabulated below.

Table 6

Mean Performance Measures for sample IPOs in 1975-1984 Categorised by Gross Proceeds

Gross Proceeds $	Ave. Adj Initial Return	Ave. 3yr Holding Period Ret. - IPOs	Ave. 3yr Holding Period Ret. - Matching firms
1m - 3m	27.45	17.94	67.54
3m -5m	18.00	20.89	58.72
5m- 10m	11.28	40.06	69.87
10m - 15m	7.51	46.25	55.99
15m - 25m	10.09	43.97	50.56
25m +	9.96	39.81	62.60
All (mean)	14.06	34.47	61.86
All (median)	4.61	16.67	38.54

Source: Ritter 1991, ibid

Investigation of this table discloses a tendency for the smaller offers, which have the highest average matching firm adjusted initial returns to have the worst aftermarket performance. All gross proceeds categories display long run underperformce.

[100] S. A. Buser and K. C. Chan, 'NASDAQ/NMS qualification standards, Ohio registration experience and the price performance of initial public offerings' Columbus, Ohio Department of Commerce and the National Association of Securities Dealers, Inc 1987

DeBondt and Thaler[101] have presented evidence that, at least for low capitalisation stocks, there is a negative relation between past and subsequent abnormal returns on individual securities using holding periods of a year or more, which they interpret as evidence of market overreaction. Ritter tests this hypothesis. He takes the initial returns for the sample stocks and puts them into quintiles and compares them to the aftermarket performance for the same groupings. There is some tendency for firms with high adjusted initial returns to have the worst aftermarket performance. This is mildly supportive of the overreaction hypothesis.

Table 7

Aftermarket Performance Categorised by Initial Return Quintiles

Matching firm adj. initial return quintile (%)	IPO ave. 3 year total return (%)	Matching firm ave. 3 year total return (%)
23.70 < IR< 373.98	9.45	61.39
8.10 < IR< 23.70	27.94	65.52
2.37 < IR< 8.10	41.56	55.82
-0.84 < IR< 2.37	45.51	60.88
-92.38< IR< -0.84	47.95	65.70

Source: Ritter 1991, ibid

In some respects, the finding is that there is a tendency for the offerings with the highest initial returns to do worst in the long run may be related to the 'implicit insurance' hypothesis. Ritter also provides evidence on the relation between returns generated and the number of IPOs occurring in each year. In general he finds a negative relation between annual issuance volume and aftermarket performance. This is consistent with the 'windows of opportunity' argument whereby firms take advantage of investors temporarily being willing to pay excessive amounts for IPOs reflecting overly optimistic assessments of future cash flows. The subsequently disappointing net cash flows produce the long term underperformance.

101 W. DeBondt and R. Thaler, 'Does the stock market overreact?', Journal of Finance Vol 40 1985 p 793 - 805

Ritter also looks at the relation between aftermarket performance and age of issuing firm. He finds that the younger firms produce the highest initial returns but the divergence of their long term return to shareholders when compared to the appropriate match sample is the greatest. The derived results are reported below. (Note that the data has been purged of potentially confusing industry effects)

Table 8

Aftermarket Performance Categorised by the Age of the Issuing Firm

Age in years	Sample Size	Ave. Matching Firm Adj. Initial Return (%)	Ave. 3 yr total return - IPOs(%)	Ave. 3 yr total return - Matched Sample (%)
0 - 1	177	23.87	16.19	76.31
2 - 4	338	14.87	19.22	53.20
5 - 9	305	13.71	33.01	65.47
10 - 19	300	9.32	42.97	67.66
20 and over	154	5.41	63.76	70.37

Source: Ritter 1991, ibid

Further work on the longer term performance of IPOs has been undertaken by Jain and Kini[102]. This paper investigates the change in operating performance of firms as they make the transition from private to public ownership. A significant decline in operating performance subsequent to the public offering is found. The authors find that IPO firms exhibit a decline in post issue operating performance, as measured by the operating return on assets and operating cash flows deflated by assets, relative to their pre-IPO levels, both before and after adjusting for industry effects. The decline in operating performance of IPO firms comes with a caveat. These firms exhibit high growth in sales and capital expenditures relative to firms in the same industry in the post-IPO period. Thus, the declining operating performance of IPO firms cannot be attributed to a lack of sales growth opportunities or cut-backs in post IPO capital expenditures. The authors also find that IPO firms where entrepreneurs retain higher ownership generally demonstrate superior performance relative to other issuing firms

[102] B. Jain and O. Kini, 'The Post-Issue Operating Performance of IPO Firms', Journal of Finance Vol XLIX No. 5 December 1994 p1699 - 1726

both before and after adjusting for industry effects. The authors find no relation between post-issue changes in operating performance and initial returns at the IPO. The decline in post issue operating performance is inconsistent with the fact that IPO firms are initially priced at high price-earnings (P/E) multiples, implying that investors have expectations of high earnings growth in the future. IPO firms start out with high price to book and P/E ratios relative to their industry counterparts but experience a decline in these ratios after the IPO. In addition, earnings per share also decline over time. Overall, these results suggest that investors appear to value firms when going public based on the expectation that earnings growth will continue, while in reality the pre-IPO profit margins, on which expectations are formed are not even maintained.

There are a number of possible explanations for the decline in the aftermarket performance. One explanation is related to the potential for increased agency costs when a firm makes the transition from private to public ownership. The reduction in management ownership that occurs when a firm goes public is likely to lead to an agency problem. As a result of the heightened conflict of interest between owners and managers, the performance of the firm could suffer. One instance of such a phenomenon being realised might be the use of funds in non value maximising projects. A second explanation might be that the managers 'window-dress the accounts of the entity prior to going public. This leads to pre-IPO performance overstatement and post-IPO performance under achievement. A third explanation is that entrepreneurs time the IPO to coincide with periods of extremely good performance which are ultimately unsustainable.

The common theme running through each of the three explanations forwarded is that they are predicated by the existence of information asymmetry among the agents and conflicts of interest between the new owners of the business and the incumbent management.

The natural question that arises is whether the long run decline in operating performance subsequent to the IPO is anticipated by the market. Stein[103], using a

[103] J. Stein, 'Efficient capital markets, inefficient firms: A model of mypoic corporate behaviour', Quarterly Journal of Economics, vol 104 1989 p655 - 669

signal jamming model, shows that even in efficient capital markets, myopic behaviour like 'window dressing' may persist. In the context of IPOs, his model implies that managers may attempt to manipulate investors' beliefs by pumping up pre-IPO earnings. In equilibrium, the market is not fooled by this behaviour and correctly anticipates and accounts for it in its valuation of the firm. Stein's signal jamming model can also be extended to show that, in equilibrium, managers may attempt to time issues and that rational investors anticipate and account for this behaviour. If the market is able to account for such actions, the long-run investment performance of IPO firms should be neutral. However, the long run investment underperformance document above suggests that the decline in operating performance is not anticipated and investors are constantly surprised by the poor performance of IPO firms. The findings of the authors suggesting declines in post issue price to book ratios, P/E ratios and earnings per share are consistent with this interpretation, suggesting that potential investors initially have high expectations of future earnings growth which are not subsequently fulfilled.

The documented positive relation between managerial ownership retention and post-issue operating performance is consistent with several explanations. Primary among these are the Jensen and Meckling agency theory hypothesis and the Leland and Pyle signalling hypothesis. According to the agency hypothesis, higher ownership retention by managers reduces their incentives to undertake non value maximising projects. Leland and Pyle suggest that, by retaining a significant ownership stake in the firm, entrepreneurs can signal project quality since false representation can be costly. Both hypotheses therefore, predict relatively superior operating performance of IPO firms with higher entrepreneurial ownership. The authors results are consistent with the predictions of both the agency theory and the signalling theory, it is difficult, if not impossible to separate out their individual effects.

Recently, Allen and Faulhaber, Grinblatt and Hwang and Welch have suggested that issuers use underpricing as a mechanism to signal their quality to the market. These models posit that high-quality firms underprice their stock at the IPO and subsequently conduct a seasoned offering when market prices are established and when there has been an opportunity for information revelation. The cost of underpricing and a positive probability of their type being revealed between the two offerings prevent the low quality firms from following suit. Thus, signalling models of underpricing predict that IPO firms that underprice should exhibit superior operating performance in comparison to those who do not.

The sample used by the authors consists of 683 firm commitment IPOs which went public in the period from 1976 to 1988. Within this sample the mean (median) initial return is 7.25%(1.17%). The mean (median) gross proceeds raised by the firms is $26.46m($12.8m). The fraction of the firm retained by the original entrepreneurs (and venture capitalists) after listing has a mean value of 71.04%, with a median value of 73.12%. These numbers suggest that the original entrepreneurs continue to hold a significant proportion of the entity post the IPO.

The authors employ two measures of operating performance. They use operating return on assets (defined as operating income before depreciation and taxes) divided by total assets at the end of the financial year. The second measure used is operating cash flows deflated by total assets at the end of the financial year. This ratio equals operating income minus capital expenditure divided by total assets. The former provides a useful measure of the efficiency of asset utilisation whereas the latter is a useful measure of operating performance as operating cash flows are a primary measure in the NPV calculation.

The authors find the following results. The median changes in operating returns are -3.58%, -7.60%, -10.58%, and -9.09% (all statistically different from zero at the 1% level) for years 0, +1, +2 and +3 relative to year -1. The industry adjusted figures show a similar trend. The median industry adjusted returns are -2.91%, -6.24%, -8.12% and -6.81% (again all significant at the 1% level) for years 0, +1, +2 and +3 relative to year -1. Hence the inferior operating performance of IPO firms cannot be attributed to industry effects. The operating cash flows deflated by total assets decline by -3.92%, -7.92%, -7.40% and -6.44% (all significant at the 1%) level for years 0, +1, +2 and +3. The industry adjusted numbers show a similar pattern of significant underperformance for each year subsequent to the IPO with a decline of -4.72% (significant at the 1% level) over the year -1 to +3 period.

While it is difficult to pinpoint the exact reason for the inferior operating performance of the IPO firms, several possibilities come to mind. Declines in post-issue operating performance can be expected if the IPO firms cannot generate pre-IPO levels of positive NPV projects or if managers fail to maintain required levels of capital expenditure. Alternatively, positive NPV projects may have negative earnings early, so that operating performance declines while investment is occurring. To examine this issue, the authors study the growth in sales, asset turnover and capital expenditure for IPO firms to see if they can explain the underperformance documented in the study.

Operating Performance of Initial Public Offering Firms

Table 9

1. Operating Return on Assets

Measure of operating perf.	From -1 to 0	From -1 to +1	From -1 to +2	From -1 to +3
Median (-1) (%) IPOs - 21.41% Matched - 13.23%				
Median change (%)	-3.58***	-7.60***	-10.53***	-9.09***
Median ind. adj. change (%)	-2.91***	-6.24***	-8.12***	-6.81***
No.of obs	667	637	593	550

Table 10

2. Operating Cash Flows / Total Assets

Measure of operating perf.	From -1 to 0	From -1 to +1	From -1 to +2	From -1 to +3
Median (-1) (%) IPOs - 11.26% Matched - 4.85%				
Median change (%)	-3.92***	-7.92***	-7.40***	-6.44**
Median ind. adj.	-2.99***	-6.67***	-5.79***	-4.72***

change (%)				
No of obs	647	619	575	532

Table 11

3. Sales

Measure of operating perf.	From -1 to 0	From -1 to +1	From -1 to +2	From -1 to +3
Median (-1) ($m) IPOs - 21.38% Matched - 24.98%				
Median change (%)	37.22***	69.96***	108.09***	143.15***
Median ind. adj. change (%)	19.80***	38.70***	60.97***	80.67***
No.of obs	673	647	603	561

*** = significant at the 1% level

** = significant at the 5% level

Although the results reported in parts 1 and 2 of the table indicate that the operating performance of the IPOs declines relative to their pre-IPO levels, it is not clear that, in the post issue period, the IPO firms levels of operating performance continue to be higher than their industry counterparts. The median levels of operating return on assets for the IPO firms decline over time, while the corresponding levels for their industry counterparts decline by a lesser amount. Further, in each of the four years examined, the IPO firms outperform their industry counterparts, although the difference declines with time. This difference is significant until year +1 and is insignificant after that point. In part 2 of the table a similar pattern of pronounced decline in operating cash flows deflated by assets for the IPO firms is observed, while the industry counterparts maintain relatively stable levels of performance. IPO firms, however, do not significantly underperform their industry counterparts in any year subsequent to year -1. In fact, the industry matched firms significantly outperform them in years +1 and +2. Thus, while IPOs start out at higher levels of operating performance, they do not continue to outperform their industry counterparts.

In part 3 of the table above the median percentage change in sales growth is reported for years 0, +1, +2 and +3 relative to year -1, both before and after industry adjustment. The median increases in sales measured relative to year one are 37.22%, 69.92%, 108.09% and 143.15% for years 0, +1, +2 and +3 respectively. The industry adjusted figures show a similar, if less pronounced, trend. These results suggest that the increase in sales for IPO firms cannot be attributed solely to industry effects.

In part 4 of the table the median percentage change in asset turnover is reported. The median percentage change in asset turnover declines by 23.44% over a four year period from -1 to +3, while over a similar period the industry adjusted decline in asset turnover is 19.98% (both significant at the 1% level). Despite the high sales growth, the decline in asset turnover is indicative of the fact that IPO firms increase their assets faster than their sales.

In part 5 of the table the growth in capital expenditure is provided and the results suggest a significant increase over all time windows. For instance, the median percentage change in capital expenditure is 167.33% (significant at the 1% level) for year +3 relative to year -1. Even after adjusting for industry effects, IPO firms have significantly higher growth in capital expenditure in comparison to similar firms.

In summary, the study finds evidence that IPO firms exhibit inferior post IPO operating performance relative to the year prior to going public. This occurs despite a pattern of high growth in sales and capital expenditures over the time period studied. The decline in operating performance is consistent with 1) ownership structure changes resulting in increased agency problems and a tendency for the entrepreneur to over-invest. 2) managers attempting to 'window dress' pre IPO performance and 3) managers timing their issues to coincide with periods of unusually good performance.

The author note that in the context of the signalling models already discussed, management equity retention should serve as a signal of IPO quality. The authors examine this phenomenon in the context of their data set by slitting the sample into two groups around the mean level of management equity retention. The derived results are that while the operating returns on assets for the high and low ownership groups decline after the IPO, the high-ownership group shows superior operating performance relative to the low ownership group for each of the four year relative to year -1. Comparing operating cash flows we find again that the high-ownership group shows significantly less deterioration in operating cash flows in comparison to the low ownership group.

The results of heavily superior operating performance from the high-retention group is wholly consistent with signalling theory. However, the authors find no evidence that firms which underprice more produce superior operating performance after the IPO.

5.5.10 Direct Costs of Going Public

Going public is a costly exercise for any firm. The costs associated may be split into two. There are the 'direct' costs associated (i.e., sponsoring banks fees) and also the 'indirect' costs of underpricing. Ritter[104], in his 1987 article, examined 1028 firms which went public in the USA. He found that the total costs of going public averaged 21.22% of the realised issue proceeds for 'firm commitment' offers and 31.87% for 'best efforts' offers.

The two contract types are a feature of the US IPO market. These will be explained in the following passage.

Both contract types the initial phase in the flotation process is the filing of documents with the Securities and Exchange Commission. In the case of a firm commitment offer, the issuing firm and the sponsor then issue a preliminary prospectus and solicit initial indications of interest from potential investors. After SEC approval has been granted the issuing firm and the sponsor hold a pricing meeting to set the offer price and the number of shares to be sold. Only when the final prospectus is issued does the sponsoring bank agree to deliver the proceeds to the issuing firm whether or not the offer is fully subscribed at the issue price. With a 'best efforts' contract the issuing firm and the sponsoring bank agree on the pricing level and then set a range of share issuance. Following the approval of the SEC the sponsor then attempts to sell as many of the shares as possible. If within some time period (usually 90 days) minimum number of shares has not been sold, the offer is withdrawn and moneys refunded to investors. Costs of going public are much higher for best efforts offers. However, it should be made clear that best efforts offers tend to be smaller then firm commitment ones and so the economies of scale may produce a slightly misleading picture.

Ritter found that in his sample the average firm commitment offer raises almost four times the amount of funds raised by a best efforts offer. Also, firms following the firm commitment route tended to be larger and to have more asset backing (a proxy for risk?). Ritter found the following data on issuing costs and initial returns.

[104] J. R. Ritter, 'The Costs of Going Public', Journal of Financial Economics 19 (1987) p269-281

Table 12

Direct expenses of going public as a percentage of gross proceeds - firm commitment

Gross Proceeds ($)	No. of offers	Underwriting Discount (%)	Other costs (%)	Total cash expenses (%)
100k - 2m	68	9.84	9.64	19.48
2m - 4m	165	9.83	7.6	17.43
4m - 6m	133	9.1	5.67	14.77
6m - 10m	122	8.03	4.31	12.34
10m - 120m	176	7.24	2.1	9.34
All offers	664	8.67	5.36	14.03

Source: Ritter 1987, ibid

Table 13

Direct expenses of going public as a percentage of gross proceeds - best efforts

Gross Proceeds ($)	No. of offers	Underwriting Discount (%)	Other costs (%)	Total cash expenses (%)
100k - 2m	175	10.63	9.52	20.15
2m - 4m	146	10.00	6.21	16.21
4m - 6m	23	9.86	3.71	13.57
6m - 10m	15	9.8	3.42	13.22
10m - 120m	1	8.03	2.4	10.43
All offers	364	10.26	7.48	17.74

Source: Ritter 1987, ibid

The evidence indicates that the direct costs of going public are approximately $250,000 plus 7% of the gross proceeds. The total costs of going public are the sum of the direct costs and the indirect costs of underpricing. These are reported for the sample in the table below.

Table 14

Ave. percentage cash expenses and initial returns, and total transactions costs as a percentage of realised market values - firm commitment

Gross Proceeds ($)	No. of offers	Cash Expenses (%)	Ave. Initial Return (%)	Ave. Total Costs (%)
100k - 2m	68	19.48	26.92	31.73
2m - 4m	165	17.43	20.70	24.93
4m - 6m	133	14.77	12.57	20.90
6m - 10m	122	12.34	8.99	17.85
10m - 120m	176	9.34	10.32	16.27
All offers	664	14.03	14.80	21.22

Source: Ritter 1987, ibid

Table 15

Ave. percentage cash expenses and initial returns, and total transactions costs as a percentage of realised market values - best efforts

Gross Proceeds ($)	No. of offers	Cash Expenses (%)	Ave. Initial Returns (%)	Ave. Total Costs (%)
100k - 2m	175	20.15	39.62	31.89
2m - 4m	146	16.21	63.41	36.28
4m - 6m	23	13.57	26.82	14.49
6m - 10m	15	13.22	40.79	25.97
10m - 120m	1	10.43	-5.42	-0.17
All offers	364	17.74	47.78	31.87

Source: Ritter 1987, ibid

The disparity in average day one returns is quite startling.

Ritter goes on to investigate the reasons for the disparity. Using the standard deviation of the aftermarket returns (over the first 20 days of aftermarket trading) as a proxy for risk he finds that the null hypothesis that the fraction of firms using best efforts contracts is the same for both high and low standard deviation firms can be rejected with greater than 99% confidence. This gives strong evidence to suggest that the disparity in the returns reported is due to the risk associated with the smaller 'best efforts' firms..

5.6 Conclusions

What the preceding discussion should make clear is that there are a number of different theories advanced to explain the phenomenon of IPO excess returns. As yet no one theory can be regarded as providing the solution to the problem.

Each theory has its merits and indeed a great deal of time and effort has been expended in the last three decades advancing and often subsequently discrediting theories as they have been advanced.

The only statement one can make with certainty is that the phenomena, as observed, continues to persist and that the search for a theoretically compelling and practically testable theory seems set to continue for the foreseeable future.

Chapter Six

6.1 Introduction

The purpose of this chapter is to examine the Initial Public Offerings market in the United Kingdom with particular reference to 'stabilisation'.

As is now clear, the post-issue performance of IPOs has puzzled financial economists for some time. In the UK, Merrit, Howe and Newbould first revealed the existence of an abnormal return generated by new issues in their 1959-1963 study. In the United States evidence of abnormal returns stretches back even further. As was disclosed in the previous chapter, the level of the abnormal return reported varies considerably from one study to the next but it would be reasonable to suggest that a return of 10% from the issue price to closing middle market price at the end of the first day of dealings is typical.

There have been a number of attempts to explain this phenomena. As now has been demonstrated, no definitive explanation has as yet been put forward. Theories essentially fall into two camps. These are that stock issues are deliberately underpriced by sponsoring investment banks (for a number of reasons) or that IPOs are priced 'accurately' by the sponsors but then the set prices are bid up by exogenous market factors such as purely speculative purchases by investors. As indicated, no explanation belonging to either of the theoretical camps has managed to explain the phenomenon properly.

The purpose of this paper is to introduce a different explanation (in a UK context). The 'new' theory is that of 'stabilisation'. Analysis of this theory has been put forward in the USA by authors such as Ruud, Schultz & Zaman, Hanley and Benveniste. Their findings are mixed but are of sufficient interest to merit investigation in a UK context.

Stabilisation is a hybrid of the existing theories in that its existence constitutes deliberate action by sponsors to manipulate the pricing of the shares but does not involve underpricing (i.e. no deliberate pricing below 'fair' value). In essence 'stabilisation' involves the broking house responsible for the issue supporting the price of the underlying stock in the aftermarket.

To find evidence of stabilisation we do not look explicitly at returns generated by IPOs but at the distribution of these returns. If there was no stabilisation taking place we would expect the distribution of log returns to form a symmetrical curve with a positive mean. If the distribution is skewed then the left hand tail of the distribution will be censored out. On that basis if analysis reveals a positively skewed distribution and if the extent of the skewness declines over time then we may well deduce that stabilisation is taking place.

This chapter is organised in the following manner. Section two provides a brief review of the literature specific to the methodology adopted in this study. A full review of the literature in respect of stabilisation can be found in chapter five. Section three contains the pricing model used in the analysis with section four containing data and results. The conclusions can be found in section five.

6.2 'Stabilisation'

Excess Returns from 'Stabilisation'

All of the empirical studies outlined provide evidence that IPOs are underpriced and provide abnormal returns to investors in the immediate post-issue period. It appears firms 'leave money on the table' in significant amounts. This is obviously a source of capital market inefficiency.

In contrast to the evidence of the many studies done to date it appears that there may be an explanation of the observed underpricing in which neither the issuer nor the sponsor deliberately underprice the offering and the flotation price does reflect the true intrinsic value of the firm. Compelling evidence of this phenomenon was put forward by Ruud (1993) where she introduces the concept of 'stabilisation' as an explanation of the excess abnormal returns made by IPOs. Her study examines not only the mean level of initial returns made by IPOs but also the distribution of these returns. The findings of the study are that instead of forming a symmetric curve with positive mean, the distribution of one day returns is found to peak sharply at zero and include very few observations in the negative left hand tail.

In contrast to the widely held view that IPO underpricing is undertaken deliberately, the findings presented here suggest that the apparent underpricing may be attributed to underwriter price support. When prices are subject to support in the aftermarket, observations which would normally appear in the negative left hand tail of the distribution may be propped up to zero or slightly negative by purchases undertaken by the sponsor at the offer price

This 'censoring' of the negative tail of the distribution of returns could produce a positive mean initial return even if issue prices were correctly set.

As was discussed earlier, underwriter price support involves transactions that prevent or retard a decline in the market price of a security. In the US, as in the UK, the relevant authorities tend to frown upon price manipulation. However on both sides of the Atlantic it is allowed. Although supporting prices may tie underwriter's capital in the short run, it has been suggested that the practice enhances underwriters' reputations with issuers and investors. The SEC has taken the position that stabilisation is not manipulative so long as the possibility of stabilisation is included in the offering documents.

Statistical analysis provides a means of evaluating whether IPO underpricing is a deliberate strategy or a consequence of support activities undertaken by underwriters. If IPO underpricing were undertaken across the board on a deliberate basis then the distribution of returns (one-day) would be roughly bell-shaped with the peak of the distribution centred some way greater than zero. However, Ruud finds that few IPOs fall below their offered price immediately and instead of the bell-shaped curve which we would expect, Ruud found that the distribution of returns peaks steeply at zero and that the left hand (negative) tail of the distribution declines sharply. This observed distribution is symptomatic of support.

In the case of IPOs, the censoring level is a return of zero. Initial returns of zero are observed in instances where returns less than zero would have been observed in the absence of support. In this way systematic support allows the right tail (positive returns) to be observed, but not the left tail. The censoring of the left tail could produce a positive mean initial return even if the IPO offering prices were set at true 'intrinsic' value.

Ruud examined 469 IPOs in the 1982/83 period and specifically looked at returns over one day, one week, two weeks, three weeks and four weeks. Using the statistical measure of skewness, kurtosis, she found that the distribution of returns was indeed skewed in the way in which she postulated and that the level of skewness declined over the time periods outlined. This is symptomatic of price support taking place and then being slowly withdrawn as time passes. Ruud was then able to determine that, net of the effect of stabilisation, the underlying share price gains were not enough to allow a profitable trading strategy net of transactions costs. From the evidence presented Ruud argues that the average abnormal return is not a function of pure underpricing by underwriters.

A number of other studies have identified 'stabilisation'. The differing approaches adopted by these studies and the results thereof have been reported already in chapter five and consequently, while mentioning their existence, no further comment will be made in this chapter.

6.3 The Pricing Model

A great deal of previous work on abnormal returns from IPOs rests on the premise that these issues are deliberately underpriced by the sponsoring banks. This has implications for the mean return which we would expect from our sample of IPOs. If the issue prices were unbiased estimates of the true valuations of the underlying companies, we should expect that the distribution of returns from the sample would have a zero mean.

If issues are deliberately underpriced then we would expect the distribution of returns[105] to have some finite mean greater than zero. However, despite the shift in the mean level of returns due to underpricing it should remain the case that the actual distribution of returns remains strictly normal.

If we assume that the estimated price, P_{est} is an unbiased estimate of the true market price (with error, ε) of the true market price P_{true} such that

$P_{est} = P_{true} \times \varepsilon$ where $\log \varepsilon \sim N(0,\sigma^2)$

Then by taking logs of each side of the above equation we derive

$\log P_{est} = \log P_{true} + \log \varepsilon$

In the process we are assuming a log - normal distribution of errors. This should be appropriate in consideration of the nature of the pricing process. The process involves the collection of many random pieces of information which it is reasonable to assume are random and have no relation to one another. We can then use the findings of central limit theorem, namely that the sum of a large number of independent random variables is distributed approximately normally.

If the offering price, P_0 is the unbiased forecast of the true price, P_{est}, then the expected value of the log price relative (the ration of the actual market price to the offering price) should be zero and the variance σ^2, the variance of the forecast error term.

Indeed, as we know that $P_0 \equiv P_{est} = P_{true} \times \varepsilon$, it follows that

$$\begin{aligned} \log(P_{true}/P_0) &= \log P_{true} - \log P_{true} - \log\varepsilon \\ &= -\log\varepsilon \end{aligned}$$

[105] Ruud's methodology will be adopted here, namely that the distribution of returns is ln(Pt/Po) for all t.

which has, by definition, expected value zero and variance σ^2.

Now assume that the initial offering price P_0, is set by the sponsor to be some positive fraction, θ, of the unbiased estimate, P_{est}, where the fraction is strictly more than zero and less than one. The expected value of the log price relative will be an unbiased estimator of $-\log\theta$, since ($0 < \theta < 1$, $-\log\theta$ is a positive number), but its variance is still σ^2. We can verify this mathematically.

Given that the offering price is set as

$$P_0 = \theta \times P_{est}$$

$$= \theta \times P_{true} \times \varepsilon$$

it follows that ..

$$\log(P_{true}/P_0) = \log P_{true} - \log\theta - \log P_{true} - \log\varepsilon$$

$$= -\log\theta - \log\varepsilon$$

which has expected value $-\log\theta$ and variance σ^2. The formula above is simply the same as the formula quoted earlier shifted by the amount of the underpricing, θ. The distribution of the returns should, therefore, not be altered by the underpricing.

The distribution of returns should be unaffected by the underpricing and this should be reflected in the statistical measurements of the returns distribution.

Therefore, underpricing should only shift the mean of a distribution of initial returns. The statistical measures of higher moments, variance, kurtosis and skewness, should not be effected.

In reference to the criticisms which have been advanced in the recent past over the validity of using a log return model, a second set of analysis is provided using standard 'non-logged' data.

Here, the excess return is defined as..

Return = $(P_i - F_i)/F_i$

Where P_i is the closing mid-market price of the shares in the aftermarket and F_i is the flotation price. The results of this second study are presented along with the main study results.

6.4 Data and Evidence

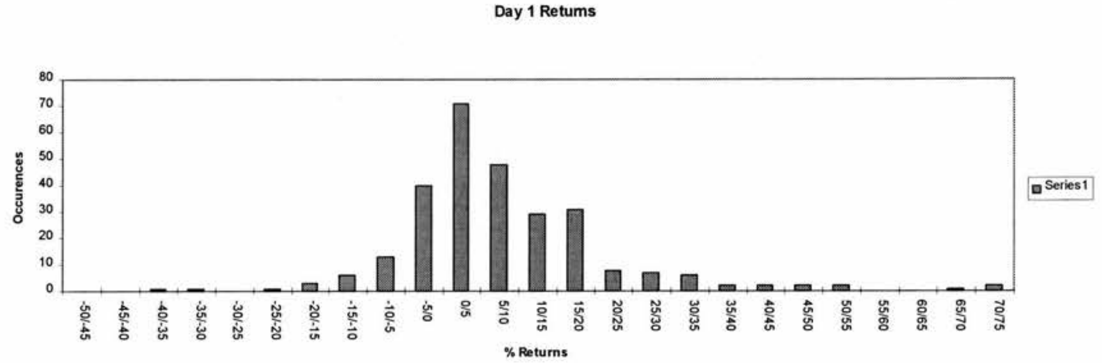
This section of the paper presents the evidence that market operators affect the returns on initial public offerings via their stabilising activities. Information on companies which floated in the UK was provided by the Quality of Markets Department of the London Stock Exchange. This information was cross-referenced against similar information provided by KPMG Corporate Finance in London who also provided financial information on the flotations and the flotation prices of the companies concerned.

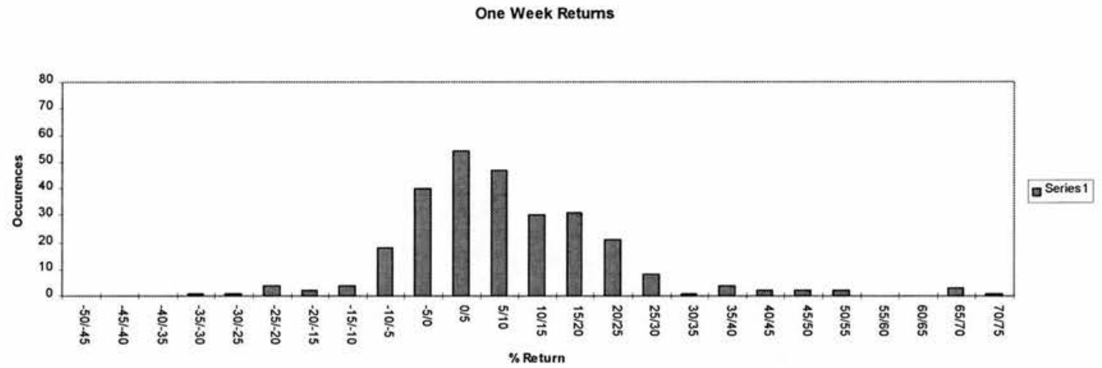
The sample consists of 287 initial public offerings made on the London Stock Market and including issues made on the Unlisted Securities Market in the UK between July 1989 and December 1994. Of the 287 firms in the sample, 257 floated on the main market and 30 on the USM. The sample accounts for some twenty eight billion pounds worth of new equity issued at the flotation price. The sample specifically excludes all corporate entities which merely moved from the USM to the main market in the sample period. Also excluded are 'reverse take-overs' and introductions. The sample was further restricted to issues of common stock. For the purposes of the study it was necessary to obtain after-market pricing data for the stocks which came to the market within the sample period. Three data sources were used to obtain the pricing data. Information was downloaded from DataStream, Bloomberg and FactSet systems and cross-referenced to ensure accuracy.

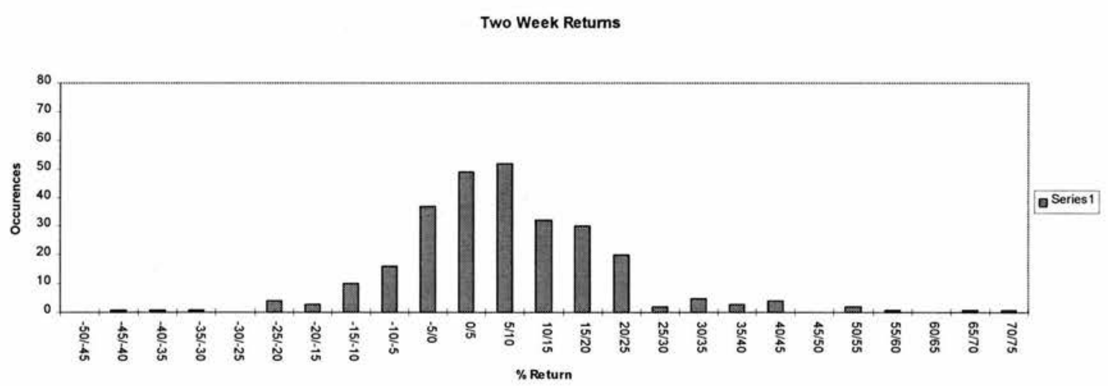
Information on middle-market closing prices one day, one week, two weeks, three weeks and four weeks after the issue started trading was obtained. In accordance with normal event study methodology, these dates corresponded to event days 1,5,10,15 and 20. The data set was then examined for possible erroneous data items. Erroneous data points which produced excess returns outwith the range greater than +75% or less than -50% were excluded. As a result twelve of the sample were excluded from the analysis.

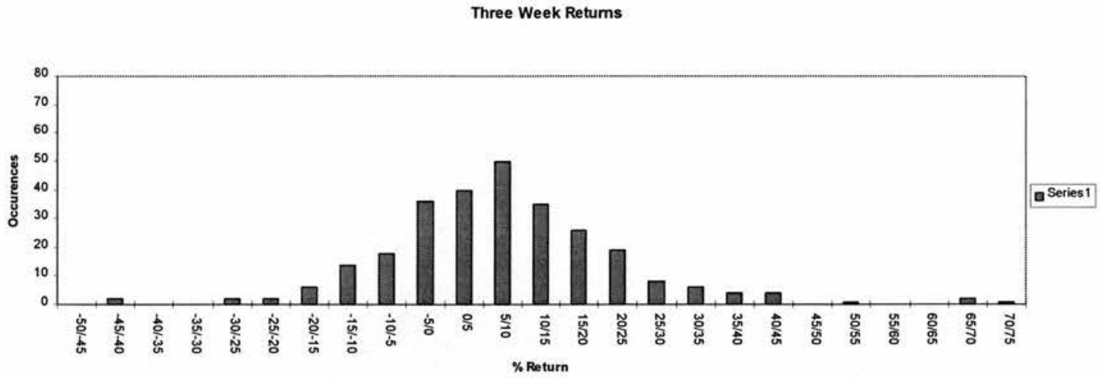
Returns are measured as the natural log of the ratio of the price in the aftermarket at time t divided by the offering price, $\log(P_t/P_0)$. As such if a stock's middle market closing price is the same as the offered price than the return will be zero. The log return as defined is the continuously compounded yield from holding the security.

The following histograms (figure 1) show the distribution of returns over the defined event periods from the sample of IPOs as discussed. The distributions are peaked at or around the zero return level and asymmetry in the distribution of the returns at the one day level can clearly be seen.









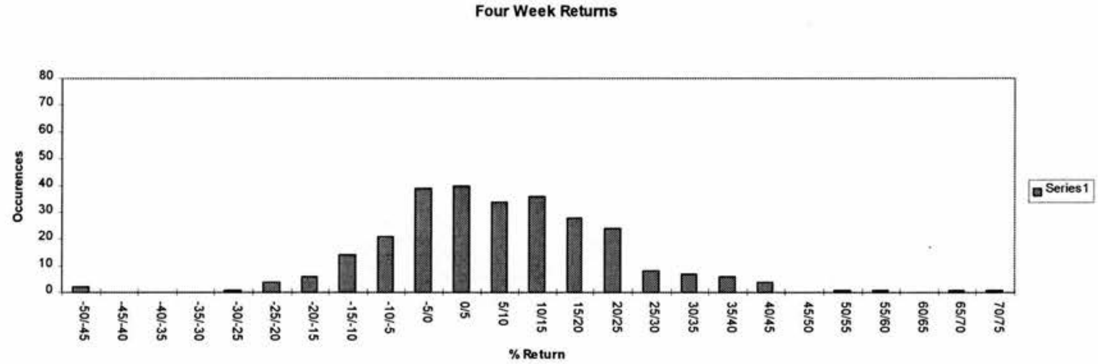


Table 1(above) - Histograms of initial returns of IPOs.

Table 2

Statistical Analysis of Returns Distributions for the IPO sample.

	Day 1 Return	Week 1 Return	Week 2 Return	Week 3 Return	Week 4 Return
Mean	8.37%	8.88%	7.90%	8.04%	8.33%
Median	5.67%	7.06%	7.15%	7.70%	7.62%
Minimum	-38.57%	-30.11%	-39.64%	-43.45%	-45.20%
Maximum	74.00%	71.11%	71.47%	70.75%	70.75%
Std. Dev	0.137	0.144	0.144	0.151	0.156
Skewness	1.339	1.253	0.738	0.653	0.401
Kurtosis	5.000	3.925	3.319	2.857	1.925

The table above summarises the statistical properties of the return distribution for the IPO sample. The first point of interest is the relationship between the mean and the median returns as shown. If a distribution of returns is symmetrical then we would expect that the mean and median measures of return would be the same. In the table above we can see that while for the two, three and four week returns this is broadly the case at the one day and one week levels the two measures are quite different. This may indicate positive but declining skewness. However the evidence that we would expect to see in that the level of the minimum return should increase over time is not as clear. While the minimum return does get worse over longer time periods it appears to get better on a one week view. This is contra to expectations. The fact that the maximum return is broadly the same over all time periods is as expected as 'stabilisation' will have no effect on the price on the upside.

Further evidence on the existence of stabilisation, which is at first significant and is then gradually removed, is provided by examination of the higher moments of the distributions, namely their skewness and kurtosis.

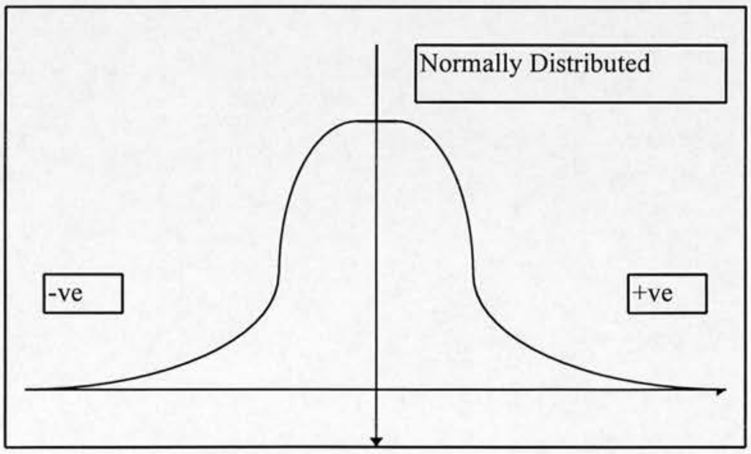
Skewness is based on the third moment of a distribution. Ruud uses Kendall and Stuart to provide a definition. They define skewness as follows.

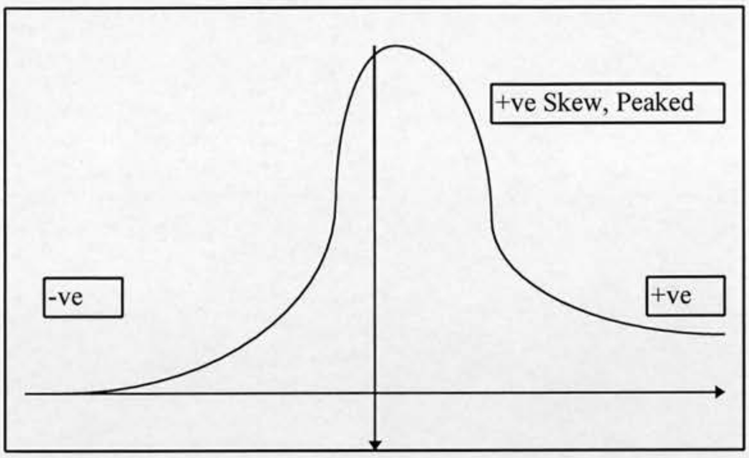
$\beta_1 = \mu^2_3 / \mu^3_2$, where μ^2_3 is the third moment about the mean squared and μ^3_2 is the variance cubed. If a distribution is symmetric then we would expect $\beta_1 = 0$. If $\beta_1 > 0$ then the distribution is said to be positively skewed. Likewise if $\beta_1 < 0$ then the distribution is said to be negatively skewed. From the data presented in Table 1 above, it can be seen that the distribution of returns is positively skewed and that this skewness decreases over time. This finding is wholly consistent with price support. Supporting the price would cause the left hand tail of the distribution to be censored out and for the whole pattern of returns to be skewed positively. Gradual abatement of support would see the distribution of returns tend to that exhibited by a normally distributed random variable. This would seem to be confirmed by the decreasing reported skewness of the sample over longer time periods.

Underwriter support, if it takes place, should result in more returns at or near zero (as negative returns will be 'propped up' to this level). We can examine this via use of measures of kurtosis. Kurtosis may be defined as follows.

$\beta_2 = \mu_4 / \mu^2_2$, where β_2 is the ration of the fourth moment about the mean divided by the variance squared. If a distribution is normal then we would expect its kurtosis to be three. If kurtosis $\beta_2 > 3$ then the distribution is said to be leptokurtic (more peaked than normal). If $\beta_2 < 3$ then the distribution is said to be platykurtic (flatter than normal). From the data in table one we can see that the distribution is significantly peaked over the one day return period, consistent with stabilisation taking place. The distribution continues to exhibit positive kurtosis over the one week time period but then the kurtosis falls away and reverts to a near normal level. These findings are consistent with underwriter price support taking place.

The following pictures illustrate the effect of positive skewness and kurtosis as found on the returns distribution.





Illustrative Diagrams of Normal / Skewed Distributions

As previously alluded too, there has been some concern voiced with regard to the validity of using the log return model with reference to determining whether stabilising activities were being undertaken by investment banks. To that end the analysis undertaken, whose results have been reported above, was repeated using non-logged returns. The results of this analysis are reported in the table below.

Table 3

Statistical Analysis of Returns Distributions for the IPO sample (Non-logged Returns)

	Day 1 Return	Week 1 Return	Week 2 Return	Week 3 Return	Week 4 Return
Mean	**8.43%**	**9.01%**	**8.51%**	**8.66%**	**9.39%**
Median	**5.59%**	**7.00%**	**7.26%**	**7.79%**	**7.68%**
Minimum	**-47.22%**	**-40.95%**	**-47.62%**	**-35.24%**	**-36.36%**
Maximum	**70.00%**	**72.35%**	**75.00%**	**66.00%**	**75.00%**
Std. Dev	**0.145**	**0.146**	**0.154**	**0.151**	**0.164**
Skewness	**0.896**	**0.948**	**0.835**	**0.636**	**0.670**
Kurtosis	**4.120**	**2.930**	**3.226**	**1.339**	**1.304**

The results of this analysis reveal that the distributions do indeed appear to be less positively skewed when non-logged returns are used. It also appears as if the distributions are marginally less peaked by virtue of the lower reported kurtosis. This positively skewed distribution, where the left hand tail of the returns distribution is censored out, is symptomatic of stabilising activities taking place.

Statistical tests were performed on the data as collected to test for the significance of the departures from normality as suggested by the reported skewness and kurtosis statistics. The full test details are reported in the statistical appendices but the following tables summarise the results found. 'FAIL' signifies that the results of the test are not consistent with those as applied to a normally distributed random variable.

Logged Data

	Day One	Day 5	Day 10	Day 15	Day 20
Normality	FAIL	FAIL	FAIL	FAIL	FAIL
Skewness	FAIL	FAIL	FAIL	FAIL	FAIL
Kurtosis	FAIL	PASS	PASS	PASS	PASS
'Overall'	FAIL	FAIL	FAIL	FAIL	PASS

Non - Logged Data

	Day One	Day 5	Day 10	Day 15	Day 20
Normality	FAIL	FAIL	FAIL	FAIL	FAIL
Skewness	FAIL	FAIL	FAIL	FAIL	FAIL
Kurtosis	FAIL	FAIL	PASS	PASS	PASS
'Overall'	FAIL	FAIL	FAIL	FAIL	FAIL

Interpreting the results of the tests, it is clear that as has already been suggested, the distributions are highly skewed over all time periods. This result is consistent for both the logged and non-logged data. The distributions also show initial statistically significant positive kurtosis but, as can clearly be seen, this soon reduces. This is evidenced by the data passing the Anscombe-Glynn kurtosis test for the later time periods. This is consistent with declining price support.

In summary, the results do point to the presence of stabilising activities with the returns distributions being initially highly skewed and peaked but with this reducing with time to the extent that the peakedness of the distributions returns to that associated with a normally distributed random variable. The positive skewness also declines over time but not to a sufficient degree to pass normality tests. This may be due to share prices in general having a returns distribution which is not strictly normal and hence even in the absence of stabilising activities the distribution of returns may exhibit some degree of skewness.

In addition to the principal analysis, further work was undertaken to examine the sample for any size characteristics. Specifically, it was sought to determine whether investment banks were more or less inclined to support larger IPOs (such as in this case government privatisation issues). For the purposes of this analysis the database was segregated at the level where new IPOs would fail to qualify for entry into the FTSE Small Cap. index of shares. The results of this analysis are presented below.

Table 4 - Returns Statistics (Split Sample)

Logged Returns Split Sample

Big Stocks (logged)	Mean	9.19%	10.78%	9.37%	10.33%	10.10%
	Median	13.18%	16.48%	14.00%	15.17%	14.70%
	Minimum	-13.84%	-9.01%	-14.19%	-16.34%	-18.39%
	Maximum	19.61%	34.73%	35.07%	34.57%	34.23%
	Std. Dev	0.100	0.110	0.109	0.121	0.124
	Skewness	-0.760	-0.301	-0.304	-0.405	-0.505
	Kurtosis	-0.540	-0.622	-0.001	-0.461	-0.440

Small Stocks (logged)	Mean	8.27%	8.63%	7.71%	7.74%	8.10%
	Median	5.33%	6.45%	6.69%	7.32%	6.80%
	Minimum	-38.57%	-30.11%	-39.64%	-43.45%	-45.20%
	Maximum	74.00%	71.11%	71.47%	70.75%	70.75%
	Std. Dev	0.141	0.148	0.148	0.155	0.160
	Skewness	1.427	1.347	0.802	0.737	0.469
	Kurtosis	4.996	4.055	3.348	3.002	1.997

Non logged returns Split Sample

Big Stocks (non logged)	Mean	10.14%	12.03%	10.45%	11.65%	11.44%
	Median	14.09%	17.92%	15.03%	16.39%	15.84%
	Minimum	-12.92%	-8.62%	-13.23%	-15.08%	-16.80%
	Maximum	21.67%	41.53%	42.00%	41.29%	40.82%
	Std. Dev	0.106	0.121	0.119	0.132	0.135
	Skewness	-0.637	-0.078	0.013	-0.156	-0.264
	Kurtosis	-0.828	-0.373	0.356	-0.423	-0.500

Small Stocks
(non logged)

Mean	8.20%	8.61%	8.26%	8.27%	9.12%
Median	5.30%	6.35%	6.67%	7.50%	6.92%
Minimum	-47.22%	-40.95%	-47.62%	-35.24%	-36.36%
Maximum	70.00%	72.35%	75.00%	66.00%	75.00%
Std. Dev	0.149857	0.148423	0.158657	0.153587	0.167489
Skewness	0.977595	1.050117	0.895614	0.723635	0.746603
Kurtosis	4.158808	3.206192	3.28098	1.537712	1.406037

Results for both logged and non-logged returns are reported but, as with the previous analysis on the whole data set, there is little material difference between the two sets of results.

What is of interest is the differences in reported skewness across the company size spectrum. It would appear that the skewness we would associate with price support is most prevalent among the smaller stocks in the sample. The statistics reported above indicate little by way of positive skewness reported in relation to the larger flotations undertaken in the sample period. In some ways this is a disingenuous fact as stabilising activities are likely to be far easier and more able to have the desired share price effect on smaller companies where injections of relatively small amounts of capital by investment banks can arrest a price decline. Obviously, for larger IPO far more capital must be risked by the banks concerned. One possible conclusion which can be arrived at from the evidence provided is that the large issues (many government privatisation issues in this case) did not need intervention when they commenced trading. Institutional and public demand was sufficiently strong to see them trade comfortably above their flotation prices (a government objective) and hence the sponsoring banks were not asked the difficult question of whether they would undertake stabilising transactions.

The following data on the variances of the returns from within the two sub-sample groups adds weight to the argument that the larger stocks appeared to have more stable return characteristics.

Table 5 - Sample Variances

	Day 1	Day 5	Day 10	Day 15	Day 20

Big Stocks	Variance	0.99%	1.20%	1.18%	1.45%	1.55%
Small Stocks (logged)	Variance	2.00%	2.20%	2.20%	2.40%	2.56%

The following table of enumerated data adds to the argument in the sense that is shows that the percentage of negative returns for both the small and large stocks is broadly the same across the different time frames. However, the strength of the inference which can be drawn from this is limited by the relatively small number of 'big' stocks in the analysis.

Table 6 - Enumerated Data[106]

Number of Negative Returns

Big Stocks	Number	%	Small Stocks	Number	%
Day 1	6	18.75%	Day 1	49	17.50%
Day 5	2	7.41%	Day 5	52	19.48%
Day 10	6	19.35%	Day 10	66	24.81%
Day 15	7	21.88%	Day 15	73	25.98%
Day 20	8	25.81%	Day 20	76	27.34%

[106] The data used to construct the table can be found in the statistical appendices relating to chapter six.

6.5 Conclusion

The results presented in section four above are most interesting. They give considerable support to the existence of some form of stabilisation in the UK. This is an explanation for IPO excess performance which has not as yet been advanced in the UK context. Stabilisation is allowed by the London Stock Exchange in the same way as it is in the USA. However, anecdotal evidence suggests that actual indications of stabilisation (in terms of an official announcement which has to be made) are far fewer. For instance Stoll, in his US based study in the late sixties indicated that 54 of 229 IPOs he examined were stabilised. The number of issues subject to stabilisation in the UK as a proportion of IPOs is much lower. It would appear then that we must look for a different explanation in the UK to explain the returns distribution which is characteristic of stabilisation taking place. The answer may lie in the quote driven order system in the UK and in the ability of market makers to buy stock back onto their own market making books at their own behest. As the average market capitalisation of IPO firms is relatively small, this could be achieved without putting significant capital at risk. Such a procedure would not constitute stabilisation per se (and would therefore not need to be communicated to the Stock Exchange) but would have the same net effect.

Extending this study to examine the relationship between the size of the IPO firm (or more explicitly, the size of the issue) and the level of abnormal return has revealed an interesting result. Intuitively, sponsoring firms should be less able to support larger issues as these issues will involve tying up a greater proportion of the firm's free capital. Indeed, this is the logical conclusion of the analysis conducted here. It does appear that sponsoring banks are far more willing and able to support the shares of smaller IPOs than they are those of large IPOs. While caution needs to be read into the analysis as a function of the market's desire for such shares at the time of flotation (and hence, as intimated to earlier the potential absence of any need to undertake stabilising transactions in any case) the evidence does point to little or no stabilising activity amongst larger IPOs.

Clearly, however, there is strong evidence to suggest that stabilisation is a feature of the market for Initial Public Offerings of shares in the United Kingdom.

Chapter Seven

7.1 Introduction

Moving on from the last chapter where persuasive evidence on the existence of stabilisation in the UK IPO market was presented, this chapter seeks to move the analysis forward by seeking to identify a further anomaly within the UK IPO market. Using the same data set as in the previous chapter, the aim of this chapter is to examine the data set to determine if IPO firms attempt to 'signal' their quality as potential investments through their choice of flotation advisers. By doing so they may be able to reduce indirect costs of underpricing.

A secondary issue which will be examined is that of whether IPO companies get 'value for money' from the advisors they choose to appoint. The point at issue here is that if there is no positive advantage to using high reputation sponsors, is there a direct cost disadvantage being borne by those companies which choose to use one? Section two contains a literature review of the work carried out in the areas of 'asymmetric information' and signalling. Section three contains details on the study methodology and the data set. Section 4 contains the empirical results and conclusions.

7.2 Review of the literature

7.2.1 Underpricing - Informational Asymmetries and Signals

7.2.1.1 'Lemons'

An excellent starting point for a debate on the role of informational uncertainty and signalling is the paper presented by George Akerlof in 1970[107]. In his paper he uses the example of the car market to illustrate his argument. He focuses on the reasons why a 'nearly new' car suffers such a severe price decline after leaving the showroom.

Akerlof sets up a model in which there are four types of car. There are new cars, used cars, 'good' cars and 'bad' cars (which he refers to as 'lemons'). Both new and used cars may be 'good' cars or 'lemons'. The individual participants in this market are ex-ante uninformed about the quality of their potential purchase; it may be 'good' or 'bad'. However, they do know that the car is 'good' with probability q and bad with probability (1-q) as these represent the probability distribution of cars produced falling into the appropriate categories as they leave the factory. After owning the vehicle for a short period of time the owner is aware of the quality of his purchase. In other words if the car is a 'lemon' this information is now revealed. Consequently, the owner revises his probability distribution concerning the quality of the purchase. This estimate benefits from the additional information now available to the owner and is, consequently, more accurate. An asymmetry of information has now developed. Should the current owner choose to sell the vehicle he has more information than any potential purchaser. However, this information is private and therefore good cars and bad cars must continue to sell at the same price. Logically, a used car cannot have the same valuation as a new car. If this were the case it would be advantageous to trade a 'lemon' at the price of a new car and buy another new car at a higher probability of being good and a lower probability of being bad. In that way the owner of a good car faces a dilemma as the price he will be able to attain for

[107] G. A. Akerlof, 'The Market for Lemons: Qualitative Uncertainty and the Market Mechanism', Quarterly Journal of Economics, August 1970 p488 - 500

the good vehicle will be less than its true value. Therefore, most cars traded will be 'lemons' and good cars may not be traded at all. The bad cars have driven out the good.

The process can be taken further. Specifically, with the example of cars Akerlof used a binary 'quality' variable. However, 'quality' could easily be a continuous variable. In such circumstance as opposed to the 'bad' driving out the 'good', the 'bad' could drive out the 'not quite so bad'... and so on in a sequence of events the culmination of which would be no market trade taking place at all.

The asymmetry problem is a feature of the initial public offerings market. A priori, potential investors are uninformed as to the quality of the potential entrant onto the market. There is no share price information available with which to assess risk and access to detailed financial information is limited. Obviously, it is in the interests of the firms involved to attain a valuation equivalent to their intrinsic 'quality'. To that end some means of 'transmitting' the quality of the firm must be found. Insiders to IPO flotations need to 'signal' the true quality of the firms as an investment in some manner before the flotation.

7.2.1.2 Signalling by 'insiders' and their agents

The original work on 'signalling' in this context was undertaken by Leland and Pyle[108]. The authors develop a model of capital structure and financial equilibrium in their 1977 paper which seeks to help resolve the asymmetry problem. In their model entrepreneurs seek financing of projects whose true qualities are known only to the entrepreneurial 'insiders'. They show that the willingness of the entrepreneur to invest can act as a signal of true project value. Such 'signalling' incurs welfare costs but the authors show that the set of investment projects which will be undertaken is the same as the set which would be undertaken in an environment where direct information transfer were possible. In essence, the entrepreneurs signal the underlying quality of the prospective IPO by assuming greater amounts of specific risk in their own portfolios than would be ideal. i.e., the entrepreneurial insiders bias the asset allocation of their personal portfolios in favour of the IPO firm and in that way send a credible signal to uninformed potential investors.
The model advocated by the authors is specified below.

$V(\alpha) = 1/(1+r).[\mu(\alpha)-\lambda]$, (1)

where $V(\alpha)$ defines the value of the firm given information signal α, r is the risk free rate, $\mu(\alpha)$ the market valuation schedule, expressing the market's perception of the true expected return as a function of α, the fraction of equity retained by the entrepreneur and λ represents the market's adjustment for the risk of the project.

Information disclosures by 'insiders' (pre-offering entrepreneurs) may also transmit information to uninformed market participants if these information disclosures are verified by agents who have reputation capital at stake. Institutions which stand to lose their reputation capital and future income through erroneous disclosures should be able to send a powerful signal to the markets concerning the quality of information released. This role for advising agents is modelled in Titman and

[108] H. E. Leland and D. H. Pyle, 'Informational Asymmetries, Financial Structure and Financial Intermediation', Journal of Finance, Vol XXXII, May 1977 p371-385

Trueman[109] (TT). They demonstrate that entrepreneurs with more favourable private information choose higher quality 'agents' to float their firms than entrepreneurs with less favourable private information. This results because higher quality agents are deemed to be more accurate in assessing the firm prospects (and consequently value) than lower quality agents. If investors can detect these agent quality differences then, as TT suggest, agent quality (and cost) should be positively related to initial firm value.

[109] S. Titman and B. Trueman, 'Information Quality and the Valuation of New Issues', Journal of Accounting and Economics, June 1986 p159 - 172

7.2.2 Empirical Studies - USA

Leland and Pyle's paper was theoretical. They introduced theory but did not provide any empirical support for their work. One of the first empirical tests of the LP model was provided by Downes and Heinkel[110] (DH) in their 1982 paper. The authors study 297 firms which went public between 1965 and 1969. Taking the LP model, (1), they estimated the following empirical form.

$$V_j = b_0 + b_1 K_1 + b_2 \alpha_j + u_j \text{ , (2)}$$

Where V_j defines the total market value of equity at the offer price, K represents the funds raised, α_j ($= \alpha + \ln(1-\alpha)$) is the percentage of equity retained by the pre offering shareholders and u_j is the disturbance term. From the LP model its clear that coefficient b_2 should be negatively signed[111]. Initial ordinary least squares (OLS) analysis supported this conclusion but the model coefficients were found to be inefficient due to the effects of heteroscedasticity. Consequently, the process was re-estimated using the weighted least squares (WLS) technique without any loss of support for the initial conclusions. The authors were consequently able to provide initial evidence in favour of the LP model.

Downes and Heinkel took the analysis one stage further by extending their original model to include variables for firm risk and for the signalling effects of dividends and underwriter quality. Within this structure, firm value was assumed to be a multiplier function of these explanatory variables and normalised firm earnings (E). The following revised functional form was estimated.

$$V_j = (a_0 + a_1.\ \alpha + a_2.Y_j + a_3.DEBT_j + a_4.IND_j + a_5.AGE_j + a_6.SLS_j + a_7.GRW_j + a_8.UWQ_j + a_9.HOT_j).E_j + U_j \text{ , (3)}$$

[110] D. H. Downes and R. Heinkel, 'Signalling and the Valuation of Unseasoned New Issues', Journal of Finance March 1982 p1 - 10
[111] i.e. the relationship is positive

Where

Y	=	Coded one if a dividend declared in the issue prospectus and zero otherwise
DEBT	=	Ratio of total debt to total assets for the equity issue
IND	=	Coded one for firms in electronics, manufacturing and computing and zero otherwise
AGE	=	Logarithm of the firm's age in years
SLS	=	Logarithm of the latest full year's sales
GRW	=	Compound growth rate in sales over the three years of accounts pre issue
UWQ	=	Dummy variable coded one for a prestigious underwriter and zero otherwise
HOT	=	Dummy variable coded one for the 'hot' issue market of July 1967 - Dec 1969

The model was so specified with parameters Y and UWQ to try to capture possible dividend signalling and underwriter reputation effects. To account for the presence of heteroscedasticity, the model parameters were divided by E and the method of non-linear least squares used in estimation of the model in its logarithmic form. The estimated parameters provided support for the LP model and also for the relationship proposed with regard to sponsor quality by Titman and Trueman. The dividend signalling hypothesis was not supported.

The support for the LP model advanced by DH was soon questioned by Ritter in his 1984 paper. Ritter argued that the positive relation between firm values and the percentage of equity retained by the entrepreneurs could be consistent not only with the LP signalling hypothesis but also with 'agency' and 'wealth' effects. In Ritter's 'wealth' effect, firms of higher value need offer less equity to obtain a given level of issue proceeds. His 'agency' argument is based on the notion that higher levels of equity retention lead to higher firm values because management will be more inclined to act in the best interests of the firm. In the wealth effect, α is treated as the endogenous variable and V as the exogenous variable whilst the reverse is the case in the agency effect. For the LP signalling effect, the direction of causation is the same as in the wealth effect as the entrepreneur selects α based on firm value, V, which is assumed to be exogenous.

In Ritter's study, 559 US firms issuing equity in the period 1965 - 1973 were studied. For these issues a direct test of the valuation equation presented by LP was conducted. The first post offering market value of equity, V, in the offerings was regressed on the percentage of equity retained, α, the net proceeds raised by the firm, K, and the level of the firms earnings in the year prior to issue. Ritter then deflated the model by the firm's pre issue book value to adjust for heteroscedasticity. Estimating the WLS equation derived, a positive relation between V and α was recorded. This positive relation is consistent with the signalling, agency and wealth hypotheses as outlined.

A useful advance on the Ritter paper is that of Krinsky and Rotenberg, who published their findings in 1989. The authors used a mixture of WLS and 2SLS techniques on a sample of 115 Canadian IPOs in the period from 1971 to 1983. The results of their analysis allowed them to reject both the agency and wealth effect hypotheses in the context of the Canadian market. The signalling effect was also rejected by the authors in an earlier part of their paper in a direct test of the LP model. The second part of the KR paper focused on the Titman and Trueman argument that quality of advising agents could help signal form value in the context of an IPO.

An important finding of the KR study is the support it offers for the Titman and Trueman signalling model. Further support for the TT model is provided by Simunic and Stein[112] (SS) who examined 490 unseasoned US offerings during 1981. From this data, the approach of Downes and Heinkel in modelling initial firm value as a function of expected earnings was employed.

[112] D. A. Simunic and M. Stein, 'Product Differentiation in Auditing: A Study of Auditor Effects in the Market for New Issues', Working Paper (University of British Columbia) 1984

They estimate the model

$V_j = m_j.E_j + u_j$ (5)

To remove the heteroscedasticity from (5) the model was deflated by company earnings (E) to give a WLS form. Within the multiplier, m, dummy variables for the quality of the investment bankers (UNQ) and auditors to the issue (AU) were defined. In addition a variable for the proportion of listed shares retained by insiders (INSIDE) was defined as well as a set of control variables. From the estimated equation, the signal variables UNQ, AU and INSIDE were all insignificantly related to firm value at the 5% level.
SS then estimated a modified model with E, above, replaced by B, the book value of shareholders equity. The new model was deflated by B. WLS estimates showed that UNQ, AU and INSIDE were all positively related to the dependent variable. While this does indeed lend some support to the LP and TT hypotheses, the volatility of the model means support cannot be given unequivocally.

At this intermediate stage it seems logical to consider the implications of the evidence presented from the USA. It seems that there is empirical support for both the LP and TT models as indeed has been discussed above. As the methodology is relatively simple it has been replicated in a number of empirical studies. It seems that there is evidence that insider equity ownership retention and flotation advisor quality can serve to indicate to potential investors the higher quality (and hence value) of a potential IPO company. However, the evidence is not unequivocal, as has been discussed. In particular, the empirical tests of the LP model present mixed results as to its validity .

7.2.3 Empirical Studies - UK

The UK stockmarket is very different in a number of ways from the markets in the USA.

Apart from being smaller in absolute terms there are differences in the way the markets are organised and in how business is transacted upon them. Specifically, the US market is characterised by a number of different exchanges[113].

Stocks can be quoted on the New York Stock Exchange (NYSE), the American Stock Exchange (AMEX) or the NASDAQ index. In the UK there is only one principal market, the London Stock Exchange. At an operational level, the US markets are 'order driven' where as the UK market operates on a 'market maker' system.

In summary, the US market is far larger than the UK market and trade is conducted in a slightly different manner. It seems proper therefore to consider some of the evidence on signalling from a UK perspective.

The results of Leland and Pyle's work were underpinned and extended in a UK setting[114] by the results of research conducted by Keasey and McGuinness[115]. They investigated the role of signalling in the valuation of unseasoned public offerings on the Unlisted Securities Market in the UK in the period from 1984 to 1986. They analyse data on 190 companies floating on the Unlisted Securities Market over the period. The model adopted by the authors is specified as follows

$$V = B_0 + B_1.RE + B_2.NEW + B_3.UND + B_4.ACC + B_5.SP + B_6.BR + B_7.MER + B_8.DF + B_9.IND + B_{10}.NA + B_{11}.E + B_{12}.GRO$$

Where

[113] More importantly, perhaps, certain stocks are more likely to be listed on certain exchanges than others. For example, the NASDAQ Exchange contains a great many high technology stocks.

[114] The first US based test was carried out by Downes and Heinkel in 1982

[115] K. Keasey and P. McGuinness, 'An Empirical Investigation of the Role of Signalling in the Valuation of Unseasoned Equity Issues., Accounting and Business Research, Spring 1992, p133-141

RE	=	Percentage of post offering equity retained by pre-listing shareholders
NEW	=	New money raised by the firm divided by gross proceeds raised
UND	=	Excess market return between issue and t+5 trading day
ACC	=	Dummy variable for quality of accountant - 1 = high quality
SP	=	Dummy variable for quality of sponsor - 1 = high quality
BR	=	Dummy variable for quality of broker - 1 = high quality
MER	=	Dummy variable for presence of an additional merchant bank - 1 = presence
DF	=	Dummy variable coded 1 if firm disclosed an earnings forecast
IND	=	Dummy variable coded 1 if firm in electricals, textiles, oil and gas and misc. industrial sectors
NA	=	Net assets on flotation
E	=	Earnings for the accounting year immediately pre flotation
GRO	=	Log of 1 plus % change in market index for two months preceding float

The results of this study were in line with the LP model. The coefficient of RE was significantly positive at the 5% level. The coefficient of the explanatory variable ACC was also significant at the 5% level, indicating support for the TT model.
From the signals considered in the analysis, the percentage of equity retained, the level of planned capital expenditure, the degree of underpricing and quality of the reporting accountants and the costs of flotation were all positively and significantly related to firm value.
The significance of the underpricing variable is of particular interest. The evidence presented suggests that firms may choose higher quality agents in the flotation process to reduce the need for underpricing.

7.2.4 Quality, Risk and Underpricing

The preceding discussion on signalling behaviour has shown that entrepreneurial insiders appear to have an incentive to use high quality advising agents to float their firms on the stockmarket. Use of such agents maximises valuations of the firms because uncertainty over the quality of the businesses is minimised through the use of 'highly' reputable advisors who put their reputation capital and income streams at stake every time they act as advisors to a flotation.

In this part of the analysis it will be hypothesised that use of such 'quality' agents should reduce excess returns (underpricing) in the aftermarket. The notion behind this statement is that higher quality advisors should only be interested in working with high quality potential IPO firms. These firms should have a lower risk (uncertainty) profile and consequently the levels of excess returns from these investments should be lower.

The starting point for this analysis is the asymmetric information model presented by Kevin Rock[116]. This model was discussed at some length in chapter five.

It is some of the inferences of the Rock model that are of particular interest for the purposes of this study. Of particular note are the studies by Ritter[117] and Beatty and Ritter[118] (BR) who note that the greater the ex-ante uncertainty surrounding the aftermarket price of an offering, the greater the level of underpricing required to compensate investors for becoming informed. Both these papers test the theory that higher ex-ante uncertainty should lead to higher excess returns and both offer support for this hypothesis.

A second proposition developed and tested in Beatty and Ritter is that sponsors who fail to enforce the relation between initial return levels and ex-ante uncertainty levels subsequently lose market share. To test this proposition 483 issues were examined

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[116] K. Rock, 'Why New Issues are Underpriced', Journal of Financial Economics, Vol 15 1986 p1051 - 1069

[117] J. Ritter, 'The 'Hot Issue' Market of 1980', Journal of Business Vol 57 1984 p215 -240

[118] R. P. Beatty and J. R. Ritter, 'Investment Banking, Reputation and the Underpricing of Initial Public Offerings', Journal of Financial Economics Vol 15 1986 p213 - 232

over the period 1977 - 1981 and the market shares for the underwriters involved in four or more offerings computed. Predicted initial returns were then computed for each firm j taken public by sponsor I. These predicted initial returns were then subtracted from the initial returns to leave a residual Ri. For each of the 49 underwriters an average residual was computed and then standardised residuals (SARs) computed for each sponsor. From this process, BR argue that the 24 underwriters with the largest SAR were pricing 'off the equilibrium line' with the remaining 25 pricing 'on the line'. For the 24 'off the line' BR noted that their market shares fell by 47% between the two sub-periods of the study.
Given that the incentive to 'cheat' and price IPOs off the 'equilibrium line' is a decreasing function of sponsor quality (prestige), a negative relation between sponsor reputation and underpricing levels should be expected. However, in this context the sponsors may not be 'cheating' per se. The relationship may reflect the fact that the less prestigious sponsors deal with issues with higher ex-ante uncertainty. Consequently, the less prestigious sponsors may in fact be enforcing the BR equilibrium and not cheating on it.

Carter and Manaster have completed some empirical work in the USA on the reputation - pricing phenomenon. They test a sample of 501 issues in the period 1979 - 1983 to determine if 'prestigious' underwriters are associated with issues which are subject to less 'price run-up' (excess return). The hypothesis tested revealed that the mean return for the prestigious underwriter group in the sample was 13.16% whereas the mean return for the other sponsors was 19.5%. The means were found to be statistically different at the 5% level. The authors also tested their hypothesis via regression analysis.
They regressed the excess return against a set of explanatory variables including a reputation variable. The reputation variable was negatively signed and found to be significant at the 5% level.

There has been similar work carried out in the context of the UK market by Holland and Horton and by Keasey and Short. Both these papers sought to identify what relation if any existed between excess returns and a number of explanatory variables hypothesised to reduce uncertainty.

Holland and Horton use a sample of 222 IPOs from the period 1984 to 1988 in their study. The results which they obtain do not substantiate the theoretical debate or the empirical evidence presented from the US studies. The relationships between equity retention and underpricing and sponsor group reputation and underpricing are either insignificant or incorrectly signed.

Keasey and Short use a sample of 230 IPOs in the period from 1986 - 1989. The results of their analysis are somewhat more in line with the theories presented. They find a significant negative relation between the reputation of the audit firm appointed as advisors to the flotation and the level of excess return. However, they find no such relation with sponsoring banks.

7.2.5 Concluding Remarks

In conclusion, the literature reviewed falls into two categories which are related but different.

In sections 7.2.1 to 7.2.3 the idea of signalling is introduced in terms of a mechanism for revealing ex-ante the quality of IPO firms. There is empirical support, which although not unequivocal, suggests equity retention by entrepreneurs and appointment of high 'quality' advisors signal the higher quality of the underlying IPO company. Consequently, this firm is more highly valued. The aim of introducing this literature is to demonstrate the efficacy of the signalling parameters.

Section 7.2.4 introduces the concept of agent quality as an explanatory variable in the differential underpricing among IPO firms. The argument introduced here is that higher quality IPO firms appoint higher quality advisors. The more reputable agents are mutually attracted to the higher quality IPOs. The higher quality IPOs should have less associated uncertainty and this should be signalled to the market via their choice of agent. The lower uncertainty should result in lower excess returns for higher quality IPOs. This argument has gained some empirical support but is far from totally supported in the literature. The empirical study undertaken seeks to examine the level of support which can be attributed to each of the two theories examined.

7.3 Study Methodology and Data

7.3.1 The Study Data

The data used in this study is concerned with initial public offerings made on the Main Market and the Unlisted Securities Market of the London Stock Exchange. The study period spans six years from July 1989 to June 1995.

The dataset was constructed in the following manner. Data on companies floating was obtained from KPMG Corporate Finance, London. The information provided included financial information on floating companies and information on the relevant professional advisors. This information was cross-referenced against information provided by the Quality of Markets Department at the London Stock Exchange for accuracy. Pricing data for the IPO companies was obtained from DataStream International and cross-referenced against a second source courtesy of FactSet Ltd. The dataset included some 302 companies.

The final sample consists of 289 companies. The average level of excess return achieved by the sample constituents on the first day of trading was 8.3%. This level represents the index adjusted return from the flotation price to the mid-market price at the end of the first day's trading. All flotation methods are considered in the analysis but as indicated in the Keasey and Short[119] study, the placing method is that most favoured by companies.

The following table indicates the flotation methods chosen by companies.

Method	Number
Placing	164
Placing / Offer for Sale	45
Placing / Intermediaries Offer	43
Offer for Sale	33
Others	4
Total	289

[119] Keasey and Short, ibid

As one of the aims of this study is to determine the effect of sponsor reputation on levels of excess return it is fundamental to this study the manner in which the various sponsoring financial institutions are demarcated. For the purposes of this study, this is achieved by using the results of an annual survey undertaken by Consensus Research International who are based in London. The Consensus Research methodology was selected as the most appropriate method of demarcating the sponsors as it did not automatically associate the sponsors who undertook the most number of deals as the best. This would have been the case if simply the number of deals done by a sponsors was taken as the choice criterion.

The Consensus Research method ranks sponsoring institutions on the basis of the perceptions of their quality as observed by those counterparty to the transactions they are involved in. For instance, financial advisors would be asked to identify which institution they regarded as the pre-eminent sponsoring bank not on the basis of which sponsor did the most deals but which in fact did the best deals. In that sense the Consensus Research method gives a much better feel for quality of sponsoring agents.

However, it should be said that this methodology, while arguably the best available, is not without flaws. It could be argued that those specialist 'boutique' investment houses, such as Beeson Gregory, do not command a sufficient 'share of mind' of the counterparties to flotations to register in the survey when, in fact they are perceived as one of the pre-eminent small companies sponsoring agents. Certainly, the possibility of this scenario persisting is testified to be virtue of the fact that all of the 'reputable sponsors' as per the Consensus Research data are large investment banks.

7.3.2 Models and Variables

In the analysis to follow, the level of underpricing is defined as:

$DISC_i = [(P_{it}/I_t)/(P_{i0}/I_0)]-1$

Where P_{it} = share price at the close of the t th day of trading

P_{i0}= offer price

I_t = FT All Share Index level at the close of the t th day of trading

I_0 = FT All Share Index level at flotation

Measuring excess returns in this level assumes that the betas of the IPO firms are unity. As previously discussed, this is a strong assumption, but one which has been used previously in the literature.

For the purposes of the study, the immediate excess return was focused upon. To that end the dependent variable is constructed to show excess return on the first day of trading.

For the current sample of 289 firms, the average underpricing was 8.3% as indicated. However, the standard deviation of 15.2% is illustrative of the variation in underpricing across the individual firms. The level of 8.3% is lower than recent studies. This may in part be reflected in the relatively large number of sizeable flotations undertaken in the period. (such as the privatisation of the water and regional electricity companies)

The variables used to explain the underpricing levels are included in the model below.

$$\begin{aligned} EXRTN = \quad & B_0 + B_1.RETD + B_2.GPROC + B_3.PTP + B_4.NAV + B_5.SPONREP + \\ & B_6.SAME\text{-}SB + B_7.AUDREP + B_8.REPREP + B_9.BIG\_STOC \end{aligned}$$

Where the variables are defined as follows

Dependent Variable	Description
EXRTN (LOG)	Level of excess return
Independent Variables	
RETD	% of post offer equity held by pre float shareholders

GPROC (LOG)	Inverse of gross proceeds of IPO
PTP (LOG)	Pre float profit divided by net assets
NAV	net asset value pre-float
SPONREP	sponsor reputation variable (dummy) coded one if the sponsor was 'reputable' and zero otherwise
SAME_SB	same sponsor and broker dummy variable coded on if the same sponsor and broker were used and zero otherwise
AUDREP	auditor reputation dummy coded one if the firm was in the 'big 6' and zero otherwise
SAME_AUD	dummy variable coded one if the issuing firm used a different reporting accountant to the appointed audit firm
BIG_STOC	size dummy variable coded one if the firm was a government privatisation issue

The focus of this study is to determine how agents can signal the quality of potential investments to circumvent the problem of ex-ante uncertainty. With this in mind a number of signalling variables have been used in this analysis to try and produce a parsimonious model of signalling behaviour.

RETD is the percentage of equity retained in the firm post issue by original shareholders. In a Leland and Pyle sense, the more equity retention by these agents, the less uncertainty and the lower the excess return[120]. GPROC is defined as the inverse of the gross proceeds raised at flotation. This measure was used by Beatty and Ritter[121] to capture the possibility that small IPOs are more speculative than larger IPOs and therefore are associated with increased ex-ante[122] uncertainty. In a similar sense PTP and NAV are included in the model to proxy the risk characteristics of smaller firms. SPONREP is a dummy variable which indicates the quality of the sponsoring merchant bank. The banks are coded as 'reputable' if they ranked in the top five in the survey[123] used for the year in question. Again, as

[120] Keasey and Short, ibid, offer an alternative explanation that if retention is too high, marketability will be reduced and this may actually increase ex-ante uncertainty. This may be a feature of the USM where they conducted their study.

[121] R. P Beatty and J. R. Ritter, 'Investment Banking reputation and the underpricing of Initial Public Offerings' Journal of Financial Economics Vol. 15 1986 p213-232

[122] ibid. p219.

[123] The data was provided by Consensus Research International. The tabulations can be found in the appendices

discussed, a higher reputation sponsor is hypothesised to reduce ex-ante uncertainty and consequently the relationship is postulated to be negative. SAME_SB is a dummy variable coded 1 if the issuing firm uses the same sponsor and stockbroker. This variable is included to determine if by using an 'integrated' merchant bank the firm further serves to reduce uncertainty ex-ante. AUDREP is a dummy variable coded 1 if the auditing firm is one of the 'big 6' firms of accountants in the UK. The SAME_AUD dummy variable is coded one if the issuing firm used the same firm of accountants to act as reporting accountants and to audit the business. Analogously to the sponsoring banks, the intuition here is that firms may appoint the same firm to act in both capacities to reduce uncertainty. BIG_STOC was introduced to test for possible differential effects between the large privatisation issues and the remainder of the issuing companies.

As an adjunct to the primary analysis a second regression model was estimated. The purpose of this model was to identify if there were any statistically significant differences in the cost functions for IPO firms using 'reputable' versus 'non-reputable' sponsoring agents. This second equation was introduced to examine further the economic efficiency of the IPO market. Specifically, if firms proved to be unable to use agent quality to signal quality a priori, were they overpaying for the services provided by sponsors?
The model estimated was as follows

$$COSTS\_OF = B_0 + B_1.SPONREP + B_2.FUNDS\_RA + B_3.SPECDV$$

Where the variables were defined as follows

Dependent Variable	Description
COSTS_OF	Costs of flotation
Independent Variables	
SPONREP	Dummy variable defined as in the original model
SPECDV	Variable defined as SPONREP * FUNDS_RA to

	allow for the identification of a differential slope between two groupings
FUNDS_RA	Funds raised by IPO firm

The model introduced regressed costs of flotation (COSTS_OF) on funds raised (FUNDS_RA) and two other explanatory variables. The two further explanatory variables introduced were SPONREP and SPECDV. The aim of the analysis was to identify if the cost functions for companies floating differed according to whether they used reputable or non-reputable sponsors. The coefficient of SPONREP acts as a 'differential intercept' coefficient and the coefficient of SPECDV acts as a 'differential slope' coefficient. If both these variable are found to have significant coefficients the implication will be that the (linear) cost functions for reputable and non-reputable sponsors have different slopes and intercepts when plotted on a graph of costs of flotation versus funds raised.

7.3.3 Empirical Methods

The empirical analysis conducted in the first instance was that of an ordinary least squares regression (OLS) with excess return as dependent variable and the explanatory variables as indicated above. Examination of the moments of the variables EXRTN, GPROC and PTP revealed these variables to be highly skewed. Therefore the log forms (natural logarithms) of these variables are included in the analysis.

The model was found to suffer from a heteroscedasticity problem. Variances were found to be non-constant. While the log transform on certain of the variables partially alleviated the problem, a more sophisticated approach was tested to attempt to a stronger statistical model. To that end weighted least squares analysis was used. WLS, using funds raised as a weighting variable, reduced the heteroscedasticity problem but the model still failed to pass the Breusch Pagan Godfrey heteroscedasticity test (as shown in the appendices).

Consequently, White heteroscedasticity consistent standard errors were derived and these have been used for inference purposes as presented in section four.

In the second estimated regression where the economic efficiency of the IPO market was examined, the only methodological point worthy of note is the introduction of the second dummy variable SPECDV. This was done to allow differential slopes of regression lines as well as differential intercepts to be accounted for. There were no further econometric problems.

7.4 Empirical Results and Conclusions

7.4.1 Results of the Study

7.4.1.1 The Main Model

The model produced the following statistical results. The WLS model achieved an R squared value of 0.52918. The value is broadly in line with that found in the other studies mentioned in the literature review. The relatively low R squared value should not come as a surprise as, as Keasey and Short[124] point out, a high R squared would imply that the actual initial excess return of an IPO was predictable.

The F statistic, at 26.1, allows us to reject the hypothesis that all the coefficients of the explanatory variables are collectively zero at the one percent level.

The following parameter values and t statistics were found for individual explanatory variables.

WLS Estimates

Variable	Est. Coefficient	Std. Error	T-statistic
RETD	-0.091309	0.023268	-3.924
LNGPROC	0.006035	0.008712	0.693
LNPTP	0.012541	0.005588	2.244
NAV	2.79755E-08	1.2171E-08	2.299
SPONREP	0.062907	0.013124	4.793
SAME_SB	-0.004805	0.016234	-0.296
AUDREP	-0.022096	0.014693	-1.504
SAME_AUD	0.002751	0.015894	0.173
BIG_STOC	-0.046818	0.014080	-3.325

[124] Keasey and Short ibid

As discussed in section three, problems of heteroscedasticity mean that inference from the WLS model cannot be made with great reliability. The White estimates are more appropriate for this purpose. They are shown below.

White Heteroscedasticity Consistent Estimates

Variable	Est. Coefficient	Std. Error	T-statistic
RETD	-0.027305	0.039971	-0.68312
LNGPROC	-0.0039985	0.013211	-0.30266
LNPTP	-0.0041487	0.011781	-0.35214
NAV	0.9895E-07	0.2841E-07	3.4835
SPONREP	0.033816	0.015954	2.1196
SAME_SB	0.012230	0.015271	0.80089
AUDREP	-0.012430	0.017923	-0.69353
SAME_AUD	-0.038123	0.021721	-1.7551
BIG_STOC	-0.034864	0.027932	0.87219
CONST	0.077626	0.091335	0.84990

Dealing with the agent reputation variables first, it appears that there is no statistical relationship between the agents involved and excess return with the exception of the sponsoring bank where the relationship is strongly significant but signed in the opposite way to expectation. It would appear that, in accordance with other UK studies, the reputations of the sponsoring advisors adds little to the resolution of ex-ante uncertainty surrounding IPOs. Consequently, there is little evidence to support the hypothesis that appointing agents of higher quality reduces ex-ante uncertainty. The results of the analysis with respect to equity retention by originating shareholders mean that there is no support for the level of equity retention by original shareholders reducing uncertainty. There is no evidence of a statistically significant relation between higher retention and lower excess returns. This is contra to the results originally suggested by Leland and Pyle.

The only other significant variable in the model was found to be NAV. This variable was significant at the five percent level. The finding that there is a significant relationship between the net asset value of the underlying company and IPO returns is contra to expectations. The findings suggest that larger firms (in terms of NAV) are associated with more uncertainty. The lack of significance of the BIG_STOC variable means that there is no evidence to suggest different levels of excess returns between larger 'privatisation' issues and the remainder of the IPOs in the sample. Finally, the lack of significance of LNPTP is indicative of this variables being unable, for the purposes of this study, to serve as a proxy of ex-ante uncertainty.

7.4.1.2 The 'Efficiency' Model

The results of the 'efficiency' model are interesting. The model achieves an R squared of 0.85556. On a similar note the F test is highly significant, indicating considerable explanatory power in the model. The following t test results were obtained.

Variable	Est. Coefficient	Std. Error	T-statistic
FUNDS_RA	0.034251	0.001871	18.311
SPONREP	662.154148	343.668670	1.927
SPECDV	-0.022711	0.001975	-11.497

The aim of modelling this relationship was to determine if differential cost functions existed between the sponsor groups. To that end the t statistics of the dummy variable coefficients are of most interest. SPECDV is highly significant while SPONREP is significant at the 5.5% level. In graphical terms what this signifies is that there are in fact two cost functions in existence, statistically dissimilar from each other, each pertaining to a different 'class' of advisor.

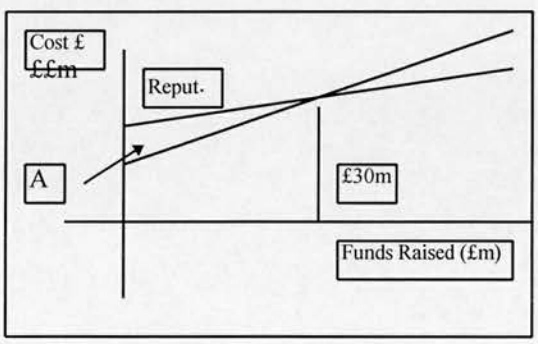

Diagram One - Differential Cost Functions

The picture above acts as a graphical representation of the situation. It shows the existence of the two cost functions as discussed. One (marked as Reput. in the diagram) represents the cost function associated with the 'high' reputation sponsors. The lower line represents the cost function for the other advisors. The statistics given in the table above allow it to be concluded that these lines have different intercepts and different slopes at statistically significant levels and this is in fact what the picture above attempts to convey.

The results suggest that there are differential cost functions in existence with regard to costs of flotation per pound of funds raised between reputable and non-reputable sponsor groupings. From the results of the analysis it appears that firms raising less than thirty million pounds of new funds incur unnecessary costs in appointing 'reputable' advisors. Basically, they find themselves on the 'top' line when they should be on the 'bottom' one.

This 'loss zone' is shown in the diagram as area 'A'. It is the extra direct cost borne by a small IPO when appointing a highly reputable advisor. The mathematics behind arriving at this figure of £30m are included in the statistical appendices.

7.4.1.3 Further Analysis

At this stage, having completed the preliminary work both on estimating the main equation and the secondary 'cost' equation, further analysis of the dataset was undertaken to determine if any more insight could be made into the results. Three specific additional avenues were followed. Firstly, bearing in mind the interesting results with regard to 'costs' as discussed in the section above, a cost of flotation variable was added to the main equation and the parameters re-estimated. Secondly, the main equation was re-estimated with a number of additional dummy variables in place to account for different offer types to investigate whether differential returns persisted across the different offer types.

Finally, the data set was divided into three sections according to the point at which the IPOs themselves were undertaken. These periods were 1989 to 1990, 1991 to 1992 and 1993 to 1995 inclusive. The main findings of these investigations are presented in this section. The full statistical backup to the work is provided in the statistical appendices on pages 31 to 47.

The results show that adding additional variables to the model did little to enhance its overall explanatory power. In fact, as the following two tables show, adding a 'costs' variable and adding variables to account for different offer types had the effect of diminishing from the overall explanatory power of the model. The models, as estimated in their new form, posses very low R squared values and F statistics, symptomatic of their relatively low explanatory power.

Results of model run with added 'costs' variable.

Ordinary Least Squares Estimation

****

Dependent variable is LNEXRTN

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
RETD	-.059612	.038870	-1.5336[.127]
LNGPROC	-.0025681	.0099828	-.25725[.797]
LNPTP	.5747E-3	.0079859	.071960[.943]
NAV	-.6164E-7	.4199E-7	-1.4680[.144]
SPONREP	-.0010265	.020095	-.051084[.959]
SSB	.0033909	.015038	.22548[.822]
AUDREP	.014244	.018280	.77921[.437]
SAUDREP	-.010453	.025116	-.41619[.678]
BIG_STOCK	-.0043452	.035331	-.12298[.902]
COSTS	.3283E-5	.2788E-5	1.1775[.240]

CONST	.058493	.078313	.74691[.456]

****

R-Squared	.047797	R-Bar-Squared	-.0010338
S.E. of Regression	.099393	F-Stat. F(10, 195)	.97883[.463]
Mean of Dependent Variable	.073621	S.D. of Dependent Variable	.099342
Residual Sum of Squares	1.9264	Equation Log-likelihood	188.9378
Akaike Info. Criterion	177.9378	Schwarz Bayesian Criterion	159.6344
DW-statistic	1.7852		

****

Results of model run with 'offer type' dummy variables

Ordinary Least Squares Estimation

****

Dependent variable is LNEXRTN

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
RETD	-.063562	.040781	-1.5586[.121]
LNGPROC	-.0023563	.010189	-.23127[.817]
LNPTP	.9901E-3	.0081080	.12211[.903]
NAV	-.5209E-7	.4487E-7	-1.1609[.247]
SPONREP	.0086607	.022288	.38859[.698]
SSB	-.0027894	.015761	-.17698[.860]
AUDREP	.014846	.018399	.80690[.421]
SAUDREP	-.013053	.025321	-.51551[.607]
BIG_STOCK	.0031595	.036343	.086934[.931]
COSTS	.3567E-5	.2830E-5	1.2604[.209]
CONST	.10556	.12807	.82423[.411]
OFFDY	-.076473	.10641	-.71865[.473]
PLDMY	-.037772	.10096	-.37411[.709]
P_INT	-.047759	.10234	-.46667[.641]
P_OFF	-.060405	.10234	-.59023[.556]

****

R-Squared	.058937	R-Bar-Squared	-.010042
S.E. of Regression	.099839	F-Stat. F(14, 191)	.85442[.609]
Mean of Dependent Variable	.073621	S.D. of Dependent Variable	.099342
Residual Sum of Squares	1.9039	Equation Log-likelihood	190.1498
Akaike Info. Criterion	175.1498	Schwarz Bayesian Criterion	150.1907
DW-statistic	1.7915		

****

What, if anything, the results of this additional analysis shows is the relative fragility of the original results. By adding, in the case of the 'costs' model, just one additional explanatory variable, the conclusions drawn from the original model cease to be valid.

This is obviously far from ideal. However, the relatively low R squared value of the original model in its unaltered from did indicate that the model's explanatory power was relatively low. This is in line with the results of previous such studies as reported in the literature. Hence, while not ideal, it's far from surprising that the results of the analysis were so markedly changed by changing the list of explanatory variables.

Addressing each of the re-estimated models individually, it is first clear that there is no relation in the whole sample between the cost of the flotation and the level of excess return. Secondly, it is equally clear that in the whole sample there no statistically significant differential return between offer types.

The final piece of additional analysis which was undertaken was to sub-divide the whole sample into three 'time slices' to determine whether any effects could be attributed to specific time periods. For the purposes of this analysis the sample was divided into three sections. Issues were sub-divided into those in the period 1989 to 1990, those in the period 1991 to 1992 and those in the period 1993 to 1995. The results of the econometric analysis are presented below. The functional form of models estimated is the same as reported in section 7.3.2.

Regression Results - 1989 - 1990 Sub Sample

Ordinary Least Squares Estimation
Based on White's Heteroscedasticity adjusted S.E.'s

Dependent variable is LNEXRTN

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
RETD	-.22936	.087740	-2.6141[.013]
LNGPROC	.019567	.024431	.80091[.428]
LNPTP	.029838	.019469	1.5326[.134]
NAV	.5666E-7	.6269E-7	.90384[.372]
SPONREP	-.051666	.030886	-1.6728[.103]
SSB	-.0060559	.029377	-.20615[.838]
AUDREP	.017314	.038716	.44720[.657]
SAUDREP	.0037512	.029040	.12917[.898]
BIG_STOCK	-.062156	.045512	-1.3657[.181]
CONST	.12016	.17106	.70246[.487]

Regression Results - 1991 - 1992 Sub Sample

Ordinary Least Squares Estimation
Based on White's Heteroscedasticity adjusted S.E.'s

Dependent variable is LNEXRTN
33 observations used for estimation from 1 to 33

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
RETD	.017636	.12265	.14378[.887]
LNGPROC	.0037779	.023990	.15748[.876]
LNPTP	-.043190	.016287	-2.6518[.014]
NAV	-.9034E-7	.8061E-7	-1.1206[.274]
SPONREP	.049233	.046415	1.0607[.300]
SSB	.016164	.038721	.41744[.680]
AUDREP	.046654	.054277	.85956[.399]
SAUDREP	-.024503	.11355	-.21579[.831]
BIG_STOCK	.081738	.051744	1.5796[.128]
CONST	.43525	.21867	1.9904[.059]

****

Regression Results - 1993 - 1995 Sub Sample

Ordinary Least Squares Estimation
Based on White's Heteroscedasticity adjusted S.E.'s

****

Dependent variable is LNEXRTN
127 observations used for estimation from 1 to 127

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
RETD	.056441	.042826	1.3179[.190]
LNGPROC	.021226	.013736	1.5453[.125]
LNPTP	.0042083	.012078	.34843[.728]
NAV	-.1821E-6	.2006E-6	-.90761[.366]
SPONREP	-.013950	.029572	-.47173[.638]
SSB	-.0058828	.015003	-.39212[.696]
AUDREP	.0062186	.014919	.41683[.678]
SAUDREP	-.0067331	.019849	-.33921[.735]
BIG_STOCK	.046736	.12552	.37233[.710]
CONST	.20952	.086160	2.4317[.017]

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The results of this analysis are interesting. Perhaps the most interesting results elate to the first sub-sample (1989-1990). While only one variable (RETD) is statistically significant at traditional levels both SPONREP and BIG_STOCK variables are worthy of note. To deal with RETD first, this is significant and negative, symptomatic of the higher levels of managerial retention being associated with lower levels of excess return. SPONREP is significant and negative at just over the 10% level, signifying that the flotations undertaken by the more reputable sponsors showed lower levels of excess return. Finally, BIG_STOCK is also negative, although the relatively low level of significance means that the result here must be treated with caution.

In summary, it appears that in this period large IPOs (where management are naturally likely to retain more shares) floated by high reputation banks showed a lower level of excess return. This may well be explained by the fact that a great number of government privatisation issues took place at that time (mostly water companies) and they made up a large number of IPOs in the context of the relatively small (46) sub-sample used for the study. The results here are consistent with the results achieved by other researchers alluded to earlier in this chapter.
What's clear is that while the effect is clear in this small sample, it is not sufficiently strong to be evidenced by the results for the sample as a whole.
The other two sub-samples produce just one significant explanatory variable, LNPTP in the 1991-1992 period. This is negative, symptomatic of less profitable firms producing higher excess returns in that period.
Outside of the interesting results from the first sub-sample, splitting the data adds little to the overall level of understanding. It does add further weight to the point made earlier that the results of the original analysis are 'fragile'.

Interpreting the results in the context of the existing literature, one may draw the following conclusions. Firstly, the fact that the models estimated appear to have relatively low levels of explanatory power is unsurprising. In perhaps the nearest UK based study to the work conducted in this chapter, undertaken by Keasey and Short[125], levels of R squared were similarly low (they report and R squared of 0.17 for their model). In addition, Keasey and Short's study also produced results which went somewhat against the theoretical implications of the work undertaken by Ritter in that they also found their sponsor reputation variable signed positively. However, while the coefficient in their study was positive, it was not statistically significant. The Keasey and Short study (which is perhaps the closest of all the preceding UK work to this analysis) also found the percentage of equity retained by entrepreneurs to be positively related to levels of excess return, contra to the theoretical literature. In addition, Keasey and Short found that the levels of discount were negatively

[125] Keasey and Short ibid

related to discount levels at statistically significant levels. This is as theory would suggest in that it points to smaller IPOs (which one would assume to be riskier) producing higher levels of excess return. The fact that the results reported in this study run against this is perhaps more evidence of the fragility of the results as previously alluded to.

What is interesting about the Keasey and Short work is that it focused on issues on the USM, namely the very smallest IPOs. When the sub-sample work undertaken in this chapter is considered in that context, it is clear that the only sub-sample period which offers support for the theoretical arguments presented in the literature relates to a period when large, government privatisation IPOs dominated. Both the other sub-sample periods (where smaller IPOs dominated) produced results similar to those generated by Keasey and Short.
The results of the other major UK originated studies in this area present a similarly confused picture in terms of their coherency with the theoretical literature. Holland and Horton[126] also fail to find a statistically significant negative relation between sponsor reputation and level of excess returns in their sample of placings undertaken in the later eighties. They do, however, find a statistically significant relation in terms of auditor quality. No such relation was evident in any of the analysis work conducted in this chapter. This may well be a consequence of the manner in which Holland and Horton chose to segregate the audit firms[127]. Certainly, previous UK studies[128] also failed to identify and negative relation.

The empirical literature from the USA offers more support for the theory that higher quality sponsoring agents are associated with lower levels of excess return in the underlying IPO. Carter and Manaster find evidence of this in their 1990 study as previously alluded to in this chapter. Even as recently as 1996, Booth and Chua[129]

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[126] Holland and Horton ibid
[127] They employed a methodology that took account of firms outside the 'big 6' accounting firms.
[128] Keasey and McGuiness, 1991 and Keasey and Short, 1992
[129] J. R. Booth and L. Chua, 'Ownership dispersion, costly information and IPO Underpricing', Journal of Financial Economics Vol 41 1996 p291 -310

found that in their sample of 2151 issues in the period from 1977-1988 underpricing was negatively related to investment banker prestige.
It would be fair to suggest that that weight of UK literature points to little or no relation between levels of underpricing and sponsor reputation but yet evidence from the USA would suggest that such a relation may well exist. Similarly, evidence from the US studies discussed earlier in this chapter points to a relation between equity retention by entrepreneurs and levels of excess return existing while UK evidence is very mixed.

There are two possible explanations for this. Firstly, the empirical work conducted in the USA may be affected by the fact that many researchers look only at 'firm commitment' IPOs in their studies. Basically, this means that the samples have a bias against 'risky' IPOs (which are conducted on a different basis known as 'best efforts'). In essence they are using a censored sample from which inference is being drawn to the population. This has clear implications for the statistical results of the studies.
Secondly, and pertinent particularly to the issue of sponsor reputation, US studies tend to use a very similar method to rank sponsoring banks. This method, which involves examining where in the 'pecking order' the bank appears on post IPO announcement 'tombstones', was originally suggested by Hayes[130] in the 1970s. The idea is very simple. The higher a sponsoring bank ranks on a tombstone, the higher its 'quality'. In this way reputation does to a degree become a function of the number of deals undertaken (and hence the number of tombstones) and not the quality of the underlying deal, a problem which the UK based studies have sought to avoid.
In summary, it may be a combination of methodological differences and issues with sample construction that account for the differences between the UK based work (with which the results presented here broadly agree) and that conducted in the USA.

[130] Hayes ibid

7.4.2 Conclusions

This chapter has investigated the level of underpricing of IPOs floating on the UK stockmarket from 1989 to 1995. The average level of underpricing was found to be 8.3%.

Given that this excess return exists, an attempt was then made to identify its cause in the context of a 'signalling' model

In particular, this study sought to find whether IPO companies can signal their reputation to potential investors through entrepreneurial equity retention and, or, by the appointing of 'superior' professional advisors. As the quality of an IPO firm is a priori unobservable, the management of these firms may be able to signal 'quality' by either assuming more systematic risk in their personal portfolios by retaining equity or by employing agents who have reputation capital to 'frank' their company's flotation with the name of the 'reputable' sponsor. Both practices should allow the 'indirect' cost of going public (the immediate excess return in the aftermarket) to be reduced.

The results of this study do not allow any significant weight to be attached to the argument outlined above. From the results of the analysis it appears that neither managerial signalling via equity retention nor the appointment of 'reputable' sponsors lowered the excess return in the main sample period, and in this sense the 'indirect' cost of going public is not reduced.

The only caveat to this is that in the small sample analysis covering 1989 - 1990 some evidence was found to support the thesis that equity retention and appointment of reputable sponsors reduces excess returns. However, the sample used here was small (46 issues) and contained a great many government privatisation issues.

That being said, the overall findings of the principal analysis are in common with much of the previous work conducted in the UK.

On the basis of these findings, support for the signalling hypothesis to alleviate ex-ante uncertainty does not appear strong.

The results concerning the economic efficiency of the IPO market are interesting. The evidence presented from the main study suggests firms are unable to signal their quality prior to flotation; excess returns for more issues backed by the more reputable sponsors are not lower than for the other IPOs. From the point of view of economic efficiency this result cannot be interpreted in light of the cost function estimated. Below a threshold level more reputable sponsors force extra direct cost on the issuing firm and there is no evidence to suggest the indirect costs of underpricing are reduced by appointing agents of 'superior' quality.

Indeed, it would appear that the use of reputable sponsors actually increases the 'indirect' costs of going public for all companies. Use of reputable sponsors by smaller companies (i.e., those raising less than thirty million pounds) forces an additional cost on them.

Chapter Eight

8.1 Introduction

The purpose of this chapter is to discuss the UK venture capital market with particular reference to venture capital backed stock market flotations.
Recently, the number of venture capital backed companies that have floated on the London markets has increased quite markedly. Empirical evidence from a number of sources including HSBC James Capel[131] and the Centre for Management Buyout Research at the University of Nottingham[132] indicated that venture capital backed firms produces superior stock market returns when compared to the broad universe of all new issues floating on the stock market.
With the increasing number of venture capital backed floats now trading on the London market, the subject of the returns generated from these investments is well worthy of investigation. The subject is closely related to the work previously undertaken in this thesis and it forms a logical adjunct to what has gone before.

This study will attempt to test this phenomenon for the data set as previously introduced. The organisation of this chapter is as follows. Section two introduces the venture capital industry in general. Section three provides more detail on management buy-outs in particular while Section four discusses the recent finding in the area of MBO research in more detail. Section five contains the methodology for the study undertaken and the empirical results while Section six presents the conclusions of the work.

[131] 'New Issue Overload', HSBC James Capel, London, 1995
[132] Centre for Management Buyout Research, Spring Quarterly 1996, University of Nottingham

8.2 Venture Capital

Venture capital is a method of financing the start-up, development, expansion or purchase of a company. In following the process the venture capitalist acquires an equity stake of the company in return for providing the funds.

As shareholders in the business, venture capitalists receive their return through participation in increasing levels of profits and on the eventual sale of the investment. This can be achieved by selling their shares to management, by means of a trade sale, or by the company achieving a listing on the Stock Exchange.

Venture capital has different characteristics to other sources of finance. The main difference between borrowed money and venture capital equity relates to asset security. Bankers are rewarded by interest and capital repayment and the amounts borrowed are usually secured either on the business assets or the individual shareholder directors' personal assets. As a last resort, a bank can bankrupt a business if the business defaults.

Venture capital financing is not secured and venture capitalists take the risk of failure just like other shareholders. Because of the risk, venture capitalists require an appropriately high rate of return. Consequently, venture capitalists favour financially sound investee companies led by managers of proven ability.

The investment period is usually between three and five years but can exceed ten years. The amounts invested tend to be over £100,000 averaging just over £1 million in 1994[133].

A venture capital funding structure can allow substantial returns to management if it performs successfully. The expectation of management is that their reduced holding in the company will produce a greater capital gain than would have been possible if the funding had been obtained from other sources. This return will be through capital growth.

A popular means of tying management's ultimate reward to that of the venture capitalist and other equity investors is via a ratchet mechanism which increases management's' equity stake depending on company performance. Performance

[133] Venture Capital in the UK: A Report and Guide to the Venture Capital Industry, HMSO, London 1996 p1

targets can relate to profitability, exit price or a target annual rate of return achieved by the institutional investor. Obviously, management needs to consider carefully the extent to which they will have control over achieving these targets.

Venture capital funding allows a company to remain in private hands, thereby avoiding the regulation and public scrutiny associated with a stock exchange listing. The presence of a venture capitalist as a shareholder should lend credibility to the business and raise its profile.

8.2.1 Raising Venture Capital Funding

Although venture capitalists claim equity is available for businesses requiring from as little as a few tens of thousands of pounds up to hundreds of millions of pounds, small amounts are very difficult to raise, particularly from institutional investors who provide most of the funding involved. This is personified in the 'equity funding' gap in the UK.

A properly structured venture capital arrangement should be put together in such a way as to obtain a capital gain for both the investor and the investee that should outweigh any measurable costs. Such costs include the shareholding and corresponding partial control over operations that is given up to the venture capitalist in return for funding. These may broadly be described as 'agency' costs.

Venture capital is relatively expensive because it involves a high degree of risk for the lender. As a function of the risk profile, a venture capital provider will require a substantial rate of return (often in excess of 25% per annum) on the amount invested. This return will usually consist of a running yield in the form of dividends and capital growth achieved on the sale or flotation of the company.

The precise return sought by the venture capitalist is governed by the quality and track record of the management team and the risks associated with the nature and size of the business. Higher returns are sought from early-stage businesses because they represent a greater risk. Few institutions are therefore willing to provide finance of less than £100,000. Institutional funding is most readily available for established businesses seeking equity funding of over £500,000[134]

One of the key factors that providers consider is the 'entry level' of the investment required, that is, the stage of development or evolution of the investee company and consequently the amount of funding it requires.

In general venture capitalists are keener to finance expansions, management buyouts and buy-ins (so-called 'development capital') than they are to finance seedcorn, start-ups and other early stage companies. This is due largely to the additional risk that is

[134] HMSO Report ibid p2

associated with early stage ventures and the time and costs involved in financing smaller deals compared with the benefits. In essence, it maybe that venture capitalists are more willing to provide development capital than venture capital.

8.2.2 The Various Stages of Venture Capital Investment

There are a number of different stages of investment which characterise the venture capital market. They can be summarised as follows:

Seedcorn

This concerns the research and development of a business idea before it is actually launched on the market. It may involve producing a prototype product or the design of a package for a service industry. It may also include initial research in order to assess the size and scope of potential markets.

Such early stage development projects require a certain level of funding. This may vary considerably according to the nature of the underlying product or service - involved and the amount of research and length of time that is needed to develop and test it fully. However, it is generally assumed that projects of this kind call for relatively small sums of money, with a possible maximum of £100,000.

It is in the nature of this development stage that the risk profile for the investor is particularly high. In contrast with a well established company with a developed product and share of its given market, it cannot be assumed at seedcorn stage that the product or service will achieve acceptance or win any market share at all. In addition, if the entrepreneur or managers do not have the right kind of experience and a proven track record in business development, the risk for the potential funding partner rises still further. Consequently, many venture capitalists avoid such early stage financing.

Start-Up

It is at the start-up stage that the product or service is initially marketed commercially. A new operating company may need to be set up and staff recruited, while the company's premises may also need to be equipped and a distribution network established.

As in the case of seedcorn investment, its unlikely that either the product or the company can be assumed to have proven itself commercially. Consequently, the risk for the investor is a high one and many venture capital providers prefer to avoid start-up projects.

Expansion Funding

This stage involves the expansion of a company which is already established and at least breaking even in financial terms. It may, according to the BVCA, also be growing profits. However, its aim in seeking venture capital funding is to expand its production capacity, recruit extra staff, extend its marketing or product development programme or acquire additional working capital.

The company and/or the product is already well established and the company's management can be assumed to have at least an adequate level of experience. This kind of investment is therefore considered to be significantly less risky than the earlier stages and, as such, it attracts venture capital much more easily.

Development Capital

Development capital is widely regarded as forming a separate category in terms of entry levels. Here, financing is required to develop an alternative product or to expand by acquiring one or more already established companies. If a company in this position has a good performance record, a project of this kind will be regarded by venture capitalists as being on a par with expansion funding as far as risk is concerned.

Management Buyout (MBO)

In a management buyout, funding is sought to enable the existing operating management, and possibly also outside investors, to acquire a business that is already established and working. As an established business, such a project is regarded as a relatively low risk in venture capital terms and MBOs have in fact been growing in popularity among venture capitalists in recent years. This rise to prominence has at least in part been driven by business re-engineering and subsequent divestment by large organisations.

Management Buyin (MBI)

In this case funding is sought to enable an external manager or group of managers to buy in to an existing company. Again, the business can be assumed to be well established and the management wishing to buy it to have an appropriate level of operating experience.
MBIs are also generally regarded as a relatively low risk proposition by venture capitalists. However, given that the management group wishing to acquire a company is obviously less familiar with it than are managers bidding for a MBO, their project may be regarded by venture capitalists as a less attractive proposition than a MBO. Consequently, required rates of return are higher for MBIs.

Secondary Purchase

The BVCA defines a secondary purchase as the purchases of shares in a company from a venture capital firm or, alternatively, from its existing shareholders. This is also assumed to involve an established company with an experienced management, proven products and a good performance track record. To the extent that this is the case, it will be regarded as a relatively low risk potential investment by the venture capitalists.

8.2.3 Venture Capitalists Approach to Different Entry Levels.

In 1994, some 68% of the number of financing made by BVCA members went into the expansion stage, 18% went into MBOs and MBIs and 14% into early stage including start-ups. However, 68% of total funds went into MBOs and MBIs, 28% into expansion and 5% into early stage investments[135]

The way Venture Capitalists approach the various different entry levels may be usefully examined by looking at them in terms of the amount of funding owners or entrepreneurs require for their projects.

The diagram below provides a rough guide to the situation faced by company and investor alike.

Table 1

Entry Levels Preferred by Funding Providers[136]

Funding Required £	Seed	No Track Record	With Track Record	MBO/MBI	Development Funding
5,000-100,000	PP	PP	PP	PP	PP
100,000-250,000	PP	PP	PG	PG	PG
250,000-500,000	PP	PP	PG	PE	PE
500,000-10m	PN	PP	PG	PE	PE
10m+	PN	PP	PG	PE	PE

The P score represents the prospects of securing funding through the venture capital industry for the 'range of funding' for the stated categories

PN-Prospects Nil

PP-Prospects Poor

PG-Prospects Good

[135] HMSO Report ibid p8
[136] HMSO Report ibid p8

The diagram presents two main points. Firstly, that there are very few institutional investors interested in seed funding, start-ups and involvement in funding in general below £100,000. Secondly, the substantial majority of institutional venture capital funds prefer to back management teams and companies who require equity funding in excess of £250,000. This size focus indicates the concentration of interest on development capital.

It is clear that the most difficult end of the venture capital funding spectrum in terms of attracting funding is the bottom end. Basically, the smaller the amount of finance required, the harder it is to raise. This gives rise to the previously mentioned 'equity funding' gap. This relates to the gap in the number of venture capitalists prepared to get involved in high risk (and smaller) equity funding. Simply, there is enough business available offering lower risk and high enough potential returns for the venture capitalists to ignore the high risk part of the market completely. However, it may be that this situation changes as the UK venture capital market becomes more competitive and mature.

Some venture capital funds seek to specialise in certain industry sectors such as biotechnology, computer related and other high-tech areas. Others actively avoid sectors such as property or film production. In general however apart from a few 'niche' players, venture capitalists are prepared to consider most industrial sectors. The quality of the management team and whether there is a proven product in an expanding market is of more concern.

In 1994[137] the general industrials sector (engineering, electronics, building construction, chemicals, paper, textiles etc.) represented the largest industry sectors of

investment by BVCA members in terms of number of companies financed. The services category (leisure, hotels, transport and distribution, retail, media etc.) represented the largest sector by amount invested.

[137] HMSO Report ibid p9

The amount of investment varies greatly with the stage of investment. Start-up and other early stage investments are almost without exception lesser in amount than expansion and MBO/MBI investments. In general few investments of less than £100,000 are made by the industry unless there is a good opportunity for a second round of financing.

In 1994 the average overall size of investment by BVCA members across categories was £1.3 million, with £429,000 for early stage, £565,000 for expansion and £4.9 million for MBO/MBI investments[138].

[138] HMSO Report ibid p9

8.2.4 Due Diligence

Due diligence is a vital part of the venture capital investment decision and extensive work will be undertaken by the potential venture capital provider regardless of what stage of financing is sought.

Venture capital due diligence is conventionally defined as the process of discovery, confirmation and clarification of the key essentials of a business in the mind of a venture capitalist. On this basis he will decide whether or not to invest and, if so, on what terms. Consequently, as commonly stated by venture capitalists, due diligence 'begins at the first meeting'.

Due diligence is crucial to the venture capital process. This is somewhat disingenuous as the venture capitalist will typically invest multi-million pound sums into unquoted businesses about which he may initially know very little, which are not readily marketable and where the prospect of any recovery on a winding-up will be remote. When properly undertaken, venture capital due diligence should be all-encompassing, detailed and searching. It can also take considerable time.

In overview, the venture capitalist will be concerned with all aspects of the target business, both those aspects verified by specialists such as patent agents and when due diligence is performed in-house.

Perhaps the most critical issue for the venture capitalist in the evaluation process will be the quality of management. In the words of one US venture capitalist, 'there is no question that irrespective of the horse (product), horse race (market), or odds (financial criteria), it is the jockey (entrepreneur) who fundamentally determines whether the venture capitalist will place a bet at all'.

A key part of the venture capitalist's analysis will be to take references on management. These can vary from the use of enquiry agents to informal social conversations with friends or acquaintances. Typically, these services combined with trade references, and in some cases taken without management's knowledge. This process can be unpleasant and unnerving for the entrepreneur. It is, however, essential and can be informative, as this type of third party endorsement will provide the venture capitalist with in many ways his best evidence that he is about to make a good investment.

8.2.5 Different Types of Funding Provider

The prospective investee company must realise that there are a number of different types of venture capital provider and each essentially has a slightly different agenda depending on what type they are.

Some suppliers of capital are independent companies which invest funds raised principally from institutions such as pension funds and insurance companies. Others are subsidiaries of banks which draw on the parent's resources for the funds on whose behalf they invest. Others again are investment trusts which take in funds from both institutions and private individuals. The investment decisions of all types of providers depend on the extent of their funding resources and their own particular targets and strategies at any given time.

Like all types of investors, individual venture capital providers have their own areas of interest and it is often possible for an investee company's management team to shop around for the right investment package. In order to find a provider who is prepared to accommodate their particular needs, it is therefore important that such managers study the investment strategies of prospective investors.

Essentially venture capital providers base their investment criteria on the entry level, size and value of the project, the industrial sector involved and the region in which it is located.

For example, some are unlikely to invest in start-ups or to provide growth capital but may instead concentrate on MBOs. Some focus on a single region of the country or on specific industrial sectors.

Investors also vary in terms of their philosophy towards their relationship with investee companies. Some may wish to appoint one of their own executives to the investee company Board, while others take a more detached, 'hands-off' approach. However, all providers will wish to monitor the investment project regularly throughout its life.

8.2.6 Different Funding Schemes

As well as there being a wide variety of different venture capital funding providers, there are also a variety of different ways in which the venture capital financing package can be constructed. Different situations call for different financial packages to be constructed and in particular the proportions of equity to debt.

The proportion of debt to equity will clearly depend on the investors own investment strategy but it will also be closely related to the nature of the business. A cash-generative business can carry a lot of debt because the debt can be serviced out of profits. A young high-tech company, on the other hand, may show no profits for several years and what will attract investors is the prospect of eventual, longer term capital gains. In such cases the investor will obviously look for a substantial equity stake.

In most cases the venture capital provider seeks to be a minority shareholder in the investee company. For instance, for a moderate-sized MBO it can be possible for the management team to hold perhaps 60% of the equity assuring them of control of the company while the investor holds, say, 40%. At the same time, the equity would be geared up with debt to meet the purchase price. In other words the managers, whose personal resources are probably reasonably modest, will have become owners of a sizeable business.

In large MBOs the managers will hold much less of the equity, and the majority of the ordinary shares will be in the hands of a syndicate of investors. No single investor likes to hold a minority of the shares, since this concentrates the risk in the hands of a single organisation. It is also likely to be a disincentive for the management to perform well.

Investors also expect managers to make a substantial personal commitment to the project in terms of investment made from their own resources. This demonstrates their faith in the business and also provides a real financial incentive to make the business a success. On the other hand, investors recognise that the really important contribution which manager bring to the party is so much money, but rather skill and talent. Because of this fluid mix, the structure can be quite flexible. Investors vary considerably, however, in how much they involve the managers in the construction of the package. This underlines the importance of checking the particular interests of the prospective venture capital funding provider. In addition to the preferences over the funding structure, the prospective investee company may want to consider the business preferences of the venture capitalists under consideration.

8.2.7 Formulating an Exit Plan

A crucial decision in investment strategy relates to time-scale, and the question of the investor's 'exit'. This depends crucially on the life of the venture capital fund. For instance, some funds have a life of ten years or more. Given this, some investors have longer time horizons than others and are prepared to allow investment projects to develop over a period of some years before they realise their capital gains (e.g., 3i). Others invest over relatively short periods. Some venture capitalists, being funded by limited life partnerships (e.g., Candover), will seek a sale of the business at between three and seven years from the date of their investment. It is likely that the equity funding structure will reflect this timescale and failure to exit can result in onerous cash dividend payments being paid to the venture capitalists.

Again, the nature of an exit may be important determinant in persuading venture capitalists to invest. Many providers will only invest in businesses which have a clear exit strategy, that is, a plan by which management will grow the business to the point where it can be sold or floated within a given time limit

However, some are not concerned with the manner in which they eventually exit from the investment project but are only concerned with its profitability and with the extent of their own gains.

Despite agreeing objectives at the time of investment, it is not uncommon for conflicts to arise between a management team and its institutional shareholders over the most appropriate time to sell. The venture capitalist is answerable to its underlying investors and is focused on the need to provide the highest overall return per annum.

8.2.8 Different Exit Routes

There are a number of different exit routes available to the venture capitalist and the investee company. Obviously, both have to agree on the chosen method of realising the exit. The choices they face are discussed in this section.

For management teams who have received an injection of development capital or carried out a management buy-out or management buy-in backed by venture capitalists, assessment of available exit routes from the project would seem to be a relatively straightforward exercise.

However, different venture capitalists may well have different expectations of their investments, particularly with regard to exit. The majority of venture capitalists manage third party funds or are organisations linked to such funds. As a result their performance is closely watched by the outside fund providers. Invariably their performance is measured by the average annual percentage increase in the value of the money invested in a particular company, which is more commonly known as the internal rate of return (IRR). In a competitive market those venture capitalists which achieve above average IRR's are more likely to attract further outside funds in the future.

The very nature of the IRR calculation means that cash flows to venture capitalists in the early years, through dividend yields, early redemption of loan capital or preference shares and, most importantly, early capital realisations can have a large and favourable impact on the fund's overall IRR performance.

If a management team can realistically foresee and exit within three to five years then a relatively short term independent fund with agreed exit horizons may well offer management the best deal. In order not to create a conflict of aspirations at the outset of the deal, management should determine realistically the likely exit route and the most realistic timescale and ensure that their aspirations and expectations are shared by their financial backers.

A low yield, exit-driven structure which includes financial incentives (for example, a ratchet to reward the management team for an early exit) may well offer the management team the best deal in the marketplace with regard to equity participation but its implications should be understood. The need for an exit may become an overriding requirement and a management team that wished to remain independent and become a public company could find itself being required to pursue a trade sale in order to preserve the deal which was originally negotiated by them.

Investment houses which are prepared to take a longer term view with regard to exits and which place more emphasis on a running yield over time will still make assumptions with regard to a likely exit route and the value which is realistically achievable at that time. Again, the management team should be comfortable with the assumptions that are being made.

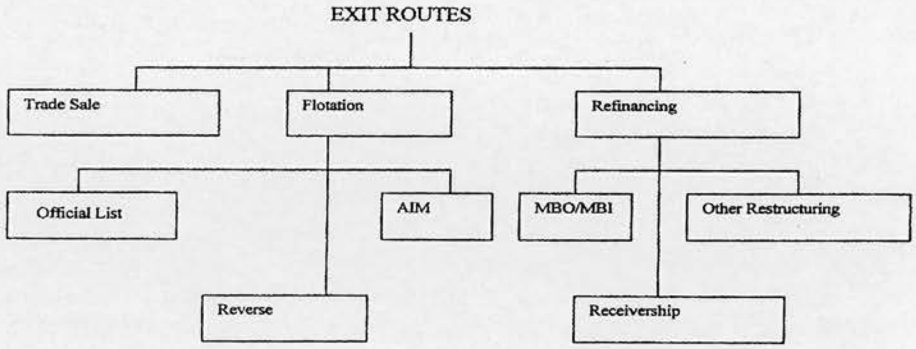
Certainly a trade sale or flotation are the most common exit routes and it should be the case that the earlier an exit is achieved the higher will be the likely rates of return to those involved. It is probably fair to say that management are encouraged to seek an early exit. This is a little simplistic. It disguises a complex issue which should be given detailed consideration prior to the initial investment. Furthermore, statistics show that the majority of investments do not achieve an exit within five years.

Two alternative exit routes to a trade sale or flotation are worth mentioning briefly. One potential option is refinancing, whereby the same or a new team of venture capitalists provide finance to acquire the shares of some or all of the existing management team and/or of the original financial backers. The other is the purchase by the company of its own shares.

The diagram below shows some of the different routes available

Table 2

Figure 1: Exit Routes



Source - HMSO Report ibid p48

Trade sale

A trade sale will normally be managed by a financial adviser who understands the unquoted market and has both credibility and experience in selling companies. Depending on the size of the business the financial adviser may be a merchant bank, a specialist boutique or a firm of accountants. The financial adviser would be expected to have contacts within the specific market sector in which the business operates and, if the size of the business makes it possible a foreign buyer may be considered.

The financial adviser would normally assist in the preparation of an information memorandum on the company which would provide information to potential purchasers. This would enable them to put forward their best price, while preserving the confidentially of commercially sensitive material, as some potential purchasers may also be competitors. In conjunction with the company, the financial adviser would draw up a short-list of the most likely potential buyers together with a reserve list.

A tightly controlled auction involving a limited number of serious potential buyers is invariably the best way of maximising the exit value. Potential buyers on the reserve list would not normally be contacted unless insufficient interest was forthcoming from the initial list or price expectations were not being met. The auction process is likely to last three to four months and negotiations will usually be led by the financial adviser. Tight control of the process is crucial.

After a second round involving perhaps two or three of the highest bidders, a preferred bidder will be chosen with whom final negotiations will be conducted. The financial adviser should ensure that significant concessions are not lost during the final negotiations, particularly in the areas of warranties and indemnities, or through last minute manoeuvres by the purchaser to reduce the purchase price.

The following diagram outlines the advantages and disadvantages of the trade sale.

Table 3

Advantages and Disadvantages of the Trade Sale

Advantages	Disadvantages
Management and investors may sell their entire shareholding	Management may lose independence
Trade sale can be carried out for any size of company	Further returns unlikely unless partial sale deal.
Quality of management is not critical	Business may face restructuring at the hands of the trade buyer
The track record and prospects can be variable	
Timing is flexible	
Weaknesses in the business can be dealt with	
A buyer can rectify commercial management problems	
Contractual arrangements can cover specific difficulties	
Trade sales can command higher values if a specific buyer places a high value on	

the business	
No ongoing worries	

Source - HMSO Report ibid p49

Flotation

A public flotation is a wholly different transaction from a trade sale. In this case the financial adviser is co-ordinating and managing the whole process of bringing the company to a public market and, as sponsor, is fulfilling on behalf of future shareholders many of the responsibilities that a corporate buyer would undertake himself. The complexities of a flotation actually mean that it is a longer process than a trade sale, typically lasting some six to seven months. The public liabilities associated with the issue of prospectus are substantial and onerous.

Much attention will be focused during the flotation process on the suitability of the company for a public listing and indeed the process is unlikely to be initiated unless the financial adviser has already reached the preliminary conclusion that the company is suitable.

The following table outlines the advantages and disadvantages of a flotation.

Table 4

Advantages and Disadvantages of a Flotation

Advantages	Disadvantages
Management retain independence	Management and investors may only be able to sell a proportion of their investment
Access to new/cheaper sources of finance to fund growth	Price will depend on market conditions
Liquid market for company shares	Timing may not be flexible
Continuing incentives/motivation	Exit transaction likely to be more difficult and costly
Prospects for enhanced investment value	Flotation may only be available to larger

	companies
Increased status and public recognition for the company	Quality of business and management are essential and any problems are likely to preclude floating the business
	There are significant regulatory requirements and commitments

Source - HMSO Report ibid p50

Refinancing

Secondary refinancing or secondary buy-outs are becoming more common, although they still account for a relatively small percentage of exits. This method of exit may be attractive as a method of passing on ownership of the business to the next generation of management. It may be necessary because of the age profile of the management team or the emergence of an able and ambitious lower management tier. Alternatively, it may be that one or two members of the management team, who have an interest in the original transaction, would also be involved in the refinancing. This can lead to an interesting conflict of interests during negotiations and great reliance being placed on the skills of the financial advisers involved.

Purchase of Own Shares

The achievement of an exit for a financial investor by the target company purchasing its own shares from the investor is relatively rare. The increase in the value of the business over time is always likely to be greater than its ability to fund an acquisition of its own shares if it meets the financial investors' required rates of return. It may, therefore, be largely ignored as an exit route for the purposes of this discussion, as it is likely to be encountered only in circumstances where the business has not performed well and the exit is not being made voluntarily.

8.2.9 Trade-Offs in the Investment Decisions of European Venture Capitalists

This section is included for comparative purposes. The aim here is to show that although investment through venture capital is by its very nature different to investment via the stockmarket, there is a high degree of correlation in terms of what criteria potential investors regard as important.

Venture capitalists are relative outsiders to the business and the management team and consequently have to use other criteria when assessing the viability of the investment. Numerous studies have been conducted in the USA but relatively little work has been carried out in the Europe. Studies have sought to identify which decision criteria venture capital investors feel are most important. Zopounidis[139] concludes that there are '*..great diversity of evaluation criteria and their relative importance from one study to another..*' but '*..the criterion of the management team is considered predominant...*'.

Hence there are a number of questions that remain unanswered from the perspective of venture capital investment in the UK and Europe.

1. What are the key investment factors used by European venture capitalists in evaluating potential investments?
2. Are the factors consistently applied by venture capitalists throughout Europe.
3. Are there clusters or groupings of venture capitalists based on the decision criteria applied?

Indeed, these very questions were posed by Muzyka, Birley and Leleux[140]. They conducted a survey to examine the issues facing European venture capitalists and how they dealt with the issues raised in the questions outlined above.

The authors examined their data using co-joint analysis. This method was chosen as it would measure quantitatively the relative importance of a list of attributes set against each other. The method is based on requesting the decision maker to make a series of paired trade-offs determining which of two given factors, all else being equal, is the more important.

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[139] Zopounidis, C. 1994, 'Venture Capital Modelling: Evaluating Criteria for the Appraisal of Investments', The Financier ACMT 1(2) May : p54-64

[140] D. Muzyka, S. Birley and B. Leleux, 'Trade Offs in the Investment Decisions of European Venture Capitalists', Paper presented for publication in the Journal of Business Venturing 1995

A review of the literature produce 35 key evaluation criteria which could be grouped into the following seven categories.

1. Financial Criteria - related to the apparent financial aspects of the investment.
2. Product-Market Criteria - related to market size, maturity and growth.
3. Strategic-Competitive Criteria - related to strategic positioning of the investment in the marketplace.
4. Fund Criteria - related to the constraints of the investment fund.
5. Management Team Criteria - related to the potential track record of the lead entrepreneur and the management team.
6. Management Competence Criteria - related to the competencies and/or capabilities of the management team in important functional areas.
7. Deal Criteria - related to the stage and nature of the investment deal.

Using these 35 criteria a questionnaire was developed which required the respondent to make 53 trade-offs between pairs of independent criteria. The collected data was then transferred into the co-joint model in order to compute the relative rankings of the investment decision criteria. The rankings by individual were then correlated to test for similarity among respondents and as input to an unweighted pairwise cluster analysis algorithm. The cluster analysis would show whether any groupings of venture capitalists based on decision criteria existed.

73 institutions across Europe from a broad range of backgrounds completed the work.

The results of the ranking of factors were as below.

Table 5

Criteria	Final Rank
Financial Criteria	
Time to break even	12
Time to payback	20
Expected rate of return	11
Ability to cash-out	9
Product-Market Criteria	

Degree mkt. already established	19
Market size	29
Seasonality of product markets	33
Sensitivity to economic cycles	30
Market growth and attractiveness	18
Uniqueness of product / technology	17
National location of business	27
Degree of product / market understanding	10
Strategic - Competitive Criteria	
Ease of market entry	24
Ability to create post entry barriers	14
Sustained share competitive advantage	6
Nature and degree of competition	26
Strength of suppliers and distribution	25
Fund Criteria	
Business meets fund constraints	15
Business and product fit within fund portfolio	28
Ability of investors to influence business	21
Location of business relative to fund	35
Management Team Criteria	
Leadership potential of mgmt. team	2
Leadership potential of lead entrepreneur	1
Recognised industry experience in team	3
Track record of lead entrepreneur	4
Track record of management team	5
Management Competence Criteria	
Marketing/Sales capabilities of team	7
Organisational / administrative capabilities of team	16

Financial/Accounting abilities of team	8
Deal Criteria	13
Stage of investment required	23
Number and nature of deal co-investors	32
Ability to syndicate deal	31
Scale and chance of later funding rounds	34
Importance of unclear assumptions	22

Source - Muzyka et al, ibid, p20

What is immediately obvious from the table above is the importance attached to the management of the company.

Overall, the venture capitalists surveyed exhibited a great deal of consistency in the relative importance they attached to the decision criteria considered in selection of investments. The table below shows the relative number of criteria from each of the seven groups that appeared in each quintile of the overall rankings for the individual factor rankings given above.

Table 6

	Top Quintile	Second 20%	Third 20%	Fourth 20%	Bottom 20%
Mgmt Team	5				
Mgmt Comp.	1	2	1		
Strat - Comp.	1	1		3	
Financial		3	1		
Product - Mkt		1	3	1	3
Fund			2	1	1
Deal				2	3

Source - Muzyka et al, ibid, p19

The pattern is worthy of note. While the relative importance of the management team is not a surprise, the lowly importance of the Product - Market grouping may be seen as surprising.

The findings suggest that venture capitalists as a group prefer to select an opportunity which offers a good management team and reasonable financial product and product-market characteristics, even if the opportunity does not meet the overall fund and deal requirements. This is interesting in terms of the implications for IPOs. If venture capitalists are doing deals which are not ideal fits with their funds then their propensity to unwind from them should be high.

In empirical work carried out in the USA by Barry, Muscarella and Vetsuypens[141] the relationship between venture capital investment and levels of aftermarket underpricing is examined. The authors find no difference in the mean level of underpricing between venture capital backed firms and those which are not venture capital backed. This is contra to the evidence presented in the UK.

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141 C.B. Barry, C. J. Muscarella and M. R. Vetsuypens, 'Venture Capital and Initial Public Offerings' Unpublished working paper, Southern Methodist University, Dallas, Tx, 1988

8.3 Management Buy-outs and Management Buy-ins

The main topic of this chapter relates to MBOs and their close relation, the MBI. Consequently, in this section the subjects are discussed in more detail.

The management buy-out (or MBO) is now an accepted and established feature of the financial market. The modern MBO was imported from the United States in the late 1970s and early 1980s. The number of transactions completed increased rapidly following the general relaxation of some of the legal complexities surrounding the deals. Venture capitalists have reacted positively to buy-outs as the market has grown. A whole industry, consisting of buy-out funds, mezzanine and senior debt lenders, financial advisers, accountants and lawyers specialising in buy-outs has been built up around it.

The first MBOs were small with the average transaction size less than £2 million. The market itself totalled less than £100 million[142]. The major source of dealflow at this stage was recession hit companies divesting non-core businesses. Finance was provided primarily in the form of equity from the small number of venture capitalists established at that time. The companies that survived the recession in the early 1980s were either sold or achieved a flotation on the stock market.

As a result of this early success the MBO market took off in the middle 1980s. Many well known names went through the buy-out process during this period including Woolworth, Parker Pen and Premier Brands. During the height of the Thatcher years managers became millionaires, with a number of venture capitalists following suit through their investment schemes.

Following the rapid growth of buy-outs during 1989 and 1990 newspaper headlines such as 'Buy-out and Burn-out heralded the demise of MBOs. A few high profile failures in the UK and the collapse of the junk bond market in the US prompted David Owen to remark that 'the growth of leverage buy-outs is a good example of the doctrine of free enterprise shooting itself in the foot. A diagram showing the number of companies using venture capital in the UK over the years is included in the graph pack with this chapter.

[142] HMSO Report ibid p77

8.3.1 The Current State of the UK MBO Market

In practice, the difficulties of the late 1980s and the early 1990s served to regulate the market. Structures became less geared and business plans more conservative. The volume and size of transactions has since grown steadily. The buy-out market has stabilised at around £3 billion[143].

Graph 2 in the graph pack charts the total transaction value of UK buy-outs for the period 1990 to 1994. The value of transactions has increased as the country recovered from recession and the funds dedicated to MBOs have increased. The average size of transaction has also increased over the period. 1994 saw an even higher level than 1989 with some £3.7 billion of MBOs completed. To put the MBO market size in context, in 1994 the total market for corporate control in the UK was £9.9 billion. MBOs represented approximately one third of this number[144]. The buyout market is therefore an important part of the UK mergers and acquisition market.

Graph 3 in the graph pack charts the total estimated number of UK buy-outs and the total number of UK merger and acquisition transactions for the period 1990 to 1994. This shows that the number of MBOs fluctuate between 500 and 600 in number. This represents on average 50% of the merger and acquisitions market. By comparison in 1984 the estimated total number of buyouts completed was 250 which represented 30% of the mergers and acquisition market. So not only have buyouts increased in number, but they have also grown as a proportion of all corporate transactions. Clearly, the management buy-out is growing in popularity as a method for disposing of subsidiary businesses.

The reasons for the increasing trend are quite clear. It is now widely recognised that giving management a stake in a business is an important motivating factor. Management teams usually have a strong desire to run their own business and to make more money as shareholders than they could merely as employees. At the same time, parent companies often like to sell to local management to ensure continuity of the business. To those companies seeking the highest price, management teams are

[143] HMSO Report ibid p77
[144] HMSO Report ibid p79

generally still able to compete effectively, using in depth knowledge gained in the business over many years.

8.3.2 Sources of Buy-outs in the United Kingdom

The buyout companies themselves can come from all possible sources including UK listed and unlisted parent companies, overseas parent companies, privatisation and receiverships. Whole listed companies have also been subject to buy-outs by management.

The largest single source of MBOs in the UK is divestment from parent companies, representing just over half of the total deals transacted in 1994. In the early eighties such divestments were an even more important source of deal flow and up to 65% of deals came from this source. Buyouts from foreign parents represent between 10% and 15% of the total[145].

The next most important source is buyouts from family ownership, which now account for 24% of all MBOs. It is this source of deal flow that has always been claimed as the most important source in Continental Europe. The commonly advanced explanation for this goes as follows.

Many businesses were formed across Western Europe at the end of the second world war by entrepreneurs who have now reached retirement age and are intending to live off the fruits of their past labour. Their family may be unable to continue with the business, a trade sale may be unattractive and managers themselves often need an incentive to progress the business further. Selling to the existing management is therefore a good solution.

However, this argument is not entirely convincing. While buyout statistics in Continental Europe are not as well developed as in the UK, those that do exist show that this source has still to be proved as important as was once forecast.

A third source is buyouts from receivership. In 1992 these grew to nearly 20% of the total. By 1994, however, they had fallen to 5%, showing that this source fluctuates with the economic cycle.

The number of privatisation buyouts has declined as the Government disposal program has progressed. However, the rail privatisation and continued port and bus sell-offs have ensured continued activity in this sector.

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[145] HMSO Report ibid p79

The number of buy-outs of listed companies has been a relatively small but constant source of transactions. However, they have generated considerable interest due-to their size and particularly to a perceived conflict of interest. For example, the utilities' role as service providers may conflict with their new, commercial aim of profit maximisation. Public buyouts will probably continue as before, although a lot depends on relative pricing in the quoted and unquoted markets.

8.3.3 Recent Trends in Buy-out Funding

The structure of buy-outs has evolved since the 1980s. Early buyouts were financed primarily with equity, but during the late 1980s financing became more geared. Partly in response to the difficulties experienced by highly-geared buy-outs and partly due to the difficulties in obtaining senior debt from the banks, gearing has declined significantly in the 1990s.

Despite a number banks returning to the MBO market in the last two years structures have remained similar to the early 1990s with senior debt relatively scarce.

New venture capital funds have been raised, no doubt enticed by the high returns achieved by venture backed buyouts, particularly following good exits as the Stock Market recovered from 1993 onwards. However, as the proportion of debt is decreased and equity increased, the reduced leverage tends to cut the overall return to the equity investors. To some extent mezzanine has filled the gap left by the reduced amounts of available senior debt and this is a more cost effective option than using venture capital.

Increasing use of vendor finance has also been a feature of the buy-out market recently. It may be that this is at the expense of mezzanine finance, although this has only been the case in one or two particular deals. A more likely answer is that it is a good way to accommodate the gap in price expectations between vendors and acquirers. The gap can be bridged by including in the financing an element which, for various reasons, the vendor and acquirer value differently. Thus, the acquirer gets an effective price reduction while the vendor achieves his expected price for the disposal.

8.3.4 Management Buy-ins

Whereas buy-outs depend on being in the right place at the right time, management buy-ins add additional flexibility to the market in order to help achieve deals which might otherwise not take place.

Financially, buy-ins work in the same way as buy-outs, the only difference being that management are brought in from outside to fill gaps in the management team or provide a completely new team able to develop the business in a different way.

The dividing line between buy-outs and buy-ins is not a distinct one, but the Centre for Management Buy-out Research has identified 145 buy-ins in 1994, the number having risen from 30 in 1985 to a peak of 148 in 1989.

Buy-ins frequently arise from family-owned businesses where there is no clear line of management succession and the owner wishes to retire. Other typical sources include receiverships and sales of divisions of larger companies which lack the complete management team required for the division to trade as a stand alone business.

The other notable feature of management buy-ins is that they are higher risk than straightforward buy-outs. They involve management teams which are new to the particular business concerned and so lack the intimate and detailed knowledge of the company, its strengths, weaknesses and future potential. The individuals may not have worked together as a team before so are an untried combination with no guarantee of success.

8.3.5 Recent Developments in Favoured Exits

Trade sale is the most popular form of exit which, while showing a decrease in time of recession, continues as an exit source. Flotation is the next most regularly used but is far more cyclical in nature. Between 1990 and 1992 this source fell to almost nothing whilst receivership rose during this period. Since 1993 flotations of buyouts have increased while receiverships have risen. For instance, in 1994 34% of all flotations (including MBOs and others) were venture backed companies[146].

[146] HMSO Report ibid p82

It should also be noted that of all the buyouts, even early ones in 1982, 40% have been recorded as not having obtained an exit

8.3.6 Conclusions

As economic conditions have changed over the past five years, the buyout industry and financing structures have also evolved. New financing instruments such as mezzanine have found an important role and the market continues to innovate. The buyout industry has weathered the last recession well. Transaction size and numbers are increasing and future prospects look relatively rosy providing there is not a return to the highly geared deals of the late eighties.

8.4 MBO Flotations - Recent Evidence

As outlined in the introduction, the aim of this chapter is to examine MBO companies which subsequently realise an exit by floating on the Stock Exchange. This section presents some recent evidence on the phenomenon.

8.4.1 Recent Developments in the UK MBO Market

The press and institutional investors themselves are sceptical about MBO management and their backers using flotations to get rich quick. Development Capitalists have been accused of floating companies which are not ready for flotation. There have certainly been cases of this but the fact remains that MBO flotations do, in general, outperform the stock market even if there are one or two flotations which in the recent past have gone badly wrong.

In the period from the first of January 1993 to the first of January 1995 there were 130 flotations in the UK. Of those 130, 75 were venture capital backed. In aggregate these companies had a market capitalisation of some 7.7 billion pounds sterling and a sum of 3.6 billion pounds sterling was raised. Overall, these venture capital backed floats, which include MBO's, have outperformed the FT-All Share index by 6.3% and their respective sectors by 9.5%. This sets their performance comfortably ahead of the universe of IPOs as a whole.

HSBC James Capel[147] continue to favour MBO flotation candidates as they usually bear the following traits. They have detailed 'due-diligence' undertaken at the time of the MBO and consequently tend to be solid businesses. They tend to be completely focused on one business area and consequently often perform better than their competitors. They have an advanced understanding of the value of cash an working capital management, often having had to bear heavy debt and the associated banking covenants of the buy-out structure. Partly as a consequence of the last point, they tend to have high quality and prompt financial reporting systems. Finally, the agency

[147] 'New Issue Overload', HSBC James Capel, London 1995

problem is mitigated to an extent due to the often significant equity ownership by the management.

A point frequently overlooked by institutions is that not all venture capitalists are the same. The behaviour of the different interest groups at flotation and in the aftermarket can be very different. If an investee company is floated, Limited Partnerships tend by statute to be required to distribute the shares in the buy-out company in specie to their limited partners. The residual shareholders are often overseas investors who are not natural holders of the equity. Consequently they often sell quickly in the aftermarket. Buyout investors such as CINVen are not required to distribute in this way. They are measured in a 'cash in versus cash out' basis and consequently can add and do hold on to their residual shareholdings for some time after the float only releasing their position when they feel the time most appropriate. Similarly, 3i the largest venture capital player in the UK market is not forced to sell stock on flotation nor is it obliged to sell before a certain period into the aftermarket. Insurance company venture capital departments do not have to sell and very frequently pass the stock on to the quoted sides. The clearing bank buy-out departments are generally sellers because its how they best refresh their funds available for new buyout opportunities.

The number of buyout and buy-ins floats during 1995, twenty nine, was significantly down on the forty nine of the previous year and thirty six of 1993.

The period to flotation of buyouts increased from the level of around three years nine months which had been sustained for the previous three years to four years, eight months[148].

First year price performance of 1995 buy-out floats was the best of the period 1992-1995, with an actual average price improvement of over a third (35.5 percent) and a relative price improvement of over a quarter (25.5 percent).

Relative long term out performance has also been achieved in the CMBOR Index (sponsored by River & Mercantile). By the end of March 1996 this had outperformed

[148] CMBOR Quarterly Review p27

the Hoare Govett Small Companies Index by 40.1 percentage points since its base date.

8.4.2 Current Trends

Recent times have seen a considerable reduction in the level of buyout and buy-in flotation activity compared to 1993 and 1994. While, overall, the number of new issues on the Official Market has fallen, sentiment towards buy-out and buy-in flotations was adversely affected by several large flotations in 1994 which subsequently performed very badly.

The number of buy-out and buy-ins floats during 1995, twenty nine, was significantly down on the forty nine of the previous year and the thirty six of 1993. Of the total buy-out and buy-ins floating, almost a third (nine) were management buy-ins, a record number.

Not only was the total number of buy-out floats considerably lower than the previous year, but their average size, £54.9 m, was also much reduced. Consequently their initial total market capitalisation was little more than two fifths of the previous year's level. In contrast the average buy-in was larger than both that achieved the previous year and that of 1995 buy-out floats. The total market capitalisation of buy-ins floating almost doubled to £74 m[149].

Some of the key characteristics of Buyout and Buyin flotations in the period from 1992-1994 are listed in the table below.

Table 7

Key Characteristics of Buyout and Buyin Flotations

	MBO	MBO	MBO	MBI	MBI	MBI
	1993	1994	1995	1993	1994	1995
Mkt Cap. - Total	1941.3	2665.6	1097.2	365.8	328.0	740.6
Mkt Cap. - Average	64.7	62.0	54.9	73.2	65.6	82.3
Net Funds Raised -	597.5	778.9	191.1	103.0	96.3	266.5

[149] CMBOR ibid p28

Total						
Net Funds Raised - Average	19.9	18.5	11.9	25.7	19.3	29.6
% share cap. offered	48.2	49.6	31.7	57.7	50.1	44.5
Ave. P/E	15.8	13.5	14.8	13.7	22.8	14.3
Ave. Yield	3.7	4.1	3.3	4.6	3.5	3.7
Period from VC inv. to float	3.9	3.9	4.8	3.9	4.2	3.1
Number floated	30	43	20	5	5	9

Source - CMBOR ibid p28

Similar trends were also seen in the amount of funds raised at float with substantial reductions from buy-outs but increases for buy-ins. The more difficult conditions for new issues were perhaps reflected in the percentage of the enlarged share capital being offered at the time of float decreasing significantly, particularly for buy-outs. This level was the lowest since the late 1980s.

Average PE ratios moved in opposite directions for buyouts and buy-ins. Despite the problems of flotation, but perhaps reflecting the overall high stock market indices for part of the year, the average PE ratio of buy-outs increased. Those of buy-ins declined from the unusual levels of the previous years.

The period to flotation of buy-outs increased from the level of around three years nine months which had been sustained from the previous three years as a group of early and mid 1980s buy-outs came to market. In contrast several buy-ins floated only a very short time after float.

8.4.3 Characteristics of Recent Management Buy-out Companies

Although two of the floated buy-outs and buy-ins could trace their origins back to the eighteenth century, those floated were on average post-war rather than pre-war as in the past two years. Some of the details of the Buyout and Buyin firms floated in 1993-1995 are listed in the table below.

Table 8

	1993	1994	1995
Year Founded	1939	1934	1947
Value at Buyout	35.1	38.1	32.8
Capitalisation at Float	65.9	62.4	63.4
Turnover in year pre float	64.7	58.2	46.0
Operating profit in year before float	5.3	6.0	4.4
Pre-tax profit in year before float	3.6	4.3	3.0
Post-tax profit in year before float	2.5	2.4	1.6
Net Borrowings in year pre float	12.8	15.9	9.3
Net Assets in year pre-float	9.0	5.1	8.5
No. of employees	1337	986	578

Source-CMBOR ibid p29

The average market capitalisation on float of buy-outs and buy-ins together was marginally up on the previous year reflecting the number of larger buy-ins. This was despite the inclusion of AIM market stocks.

The longer period between buy-out and float is likely to be one of the main factors behind both the broad maintenance of market capitalisation levels, despite the companies on average having a smaller valuation at the time of buy-out or buy-in, and the increase in the average net assets of the companies in the year before flotation.

There was also a considerable reduction in the average net borrowings of the companies in the year before flotation.

The average size of company in terms of average number of employees was substantially reduced, with only six of the floated buy-outs and buy-ins employing more than one thousand full time employees.

There were major variations in the profitability of the companies, with five making pre-tax losses and four operating losses in the year before flotation.

Examination of the original sources of all buyouts and buy-ins which exited in 1994 and 1995 shows that those which were originally divestment's from a UK parent were by far the most likely to exit through a flotation. In contrast, those bought from family or private shareholders were very unlikely to exit through a float despite their importance as a source in the overall buyout and buy-in market

The details on sources of floated MBOs are listed in the table below.

Table 9

	Float	Float	Trade Sale	Trade Sale	Rec.ship	Rec.ship
	1994 (%)	1995 (%)	1994 (%)	1995 (%)	1994 (%)	1995 (%)
Rec.ship	8.3	14.3	5.7	11.7	14.6	17.2
UK Parent	58.3	57.2	36.8	40.4	43.8	40.6
Foreign Parent	10.4	7.1	12.6	9.6	14.6	5.1
Private	10.4	7.1	20.7	27.6	20.8	29.7
Priv-ation	6.3	14.3	23.0	9.6	20.1	1.6
Going Pvt	6.3	0.0	1.3	1.1	4.1	7.8

Total	100	100	100	100	100	100
Sample	48	28	87	48	48	64

Source-CMBOR ibid p29

The CMBOR examined new issue prospectuses to determine the reasons stated for flotation. The results of their study are shown in the table below.

Table 10

Reason	Total Number	Total %
Pay-off buyout loans - personal	19	65.5
Pay-off buyout loans - company	24	82.8
Realise part of VC investment	19	65.5
Expansion - General	26	89.7
Expansion - WC	9	31.0
Expansion - Fixed Capital	3	10.3
Expansion - Acquisition	13	44.8
Status	19	65.5
Employee share ownership	10	34.5

Source-CMBOR ibid p30

Clearly, reasons may be influenced by advisers suggesting a set pattern of responses. Nevertheless some important changes were noted compared to the same classifications for 1994 flotations. The two most important reasons stated (although in reverse order from 1994) were for general expansion purposes and to pay off buyout loans taken on by the company.

Flotation also gives the opportunity for management and venture capital providers to sell some of their holdings at the time of flotation. There was significantly less inclination to do this during 1995, reflecting the concerns of the market as to the long term commitment of previous stockholders following the disappointing performance of several floated buy-outs in 1994. Indeed there were a number of cases where no shares were sold at all and several where directors increased their holdings.

Previous studies suggest that the extent of share ownership both at the time of buyout or buy-in and following a subsequent flotation may be closely associated with performance. Traditionally employee participation at the time of flotation has been given priority. Evidence shown above indicates a sharp decline in the importance of flotation as a means of giving employees the opportunity to own shares. Just over a third of new issue particulars suggested this compared to nearly two thirds the previous year.

Further support for declining involvement of the wider employee body was seen in the arrangements made for employees to obtain shares at the time of float. This fell significantly to under three fifths of buyout and buy-in flotations. There was little change in the percentage of companies having general share option schemes although there was, surprisingly, a decline in the incidence of executive schemes.

After float the percentage of equity held by directors and management, 24.7 percent, was higher than in the previous year (21.9 percent). This may reflect the smaller original value of transactions and the larger number of 1980's buy-outs, where management equity holdings were larger than more recently completed deals, as well as the smaller overall percentage of the enlarged share capital being sold at the time of flotation. There were large variations in insider share ownership between companies; some 17 percent of companies, a similar level to 1994, had management stakes of at least 40 percent.

In line with the reduction in buy-outs and buy-ins floating in 1995, the number of buyout float millionaires declined from seventy five in 1994 to fifty five in 1995. There was however an increase in the percentage of managers having an initial flotation stake of between £lm and £2m. While considerable publicity is given to the millionaires, it is interesting to note that just over a quarter of executive directors, a similar proportion to 1994, have share stakes worth less than £0.25m on flotation.

Among other post flotation stake holders, there was a slight increase in venture capital share of the equity to 29.2 percent. With the lower amount of equity being offered, only two fifths (39.7 percent) emerged in public ownership immediately after flotation[150].

The extent to which individual venture capital firms may seek to exit their investee companies through flotation rather than other forms of exit may to some extent reflect different preferences and funding sources.

[150] CMBOR ibid p31

8.4.4 Stock Market Performance of Recently Floated MBOs/MBIs

This section contains detail on the main features of individual company performance in 1995.

Unlike the very varied individual performance of buy-out and buy-in flotations seen during 1994, 1995s' new issues had an overall more satisfactory price performance as measured both in terms of actual share price movements and relative to the FT-All Share Index.

On this basis the ten best performing floated buyouts and buy-ins, or 34.5 percent of the number coming to market in 1995, had a relative share price out-performance of at least thirty percent with five of at least fifty percent. In comparison with last year, four of this year's floats outperformed on a relative basis the best of the 1994 floats[151]. Only three of this year's floats performed worse than 10 percent below the FT-All Share Index compared with nine (18.8 percent) the previous year.

First year price performance of 1995 buy-out floats was the best of the period 1992-1995 with an actual average price improvement of over a third (35.5 percent) and a relative price improvement of over a quarter (25.5 percent). These figures include reverse-in stocks and AIM flotations[152].

This improvement was particularly marked in comparison with the initial performance of 1994 buy-out and buy-in floats where there was only a very marginal price improvement. During 1995 there was a marked improvement in the actual share price of 1994 floats reflecting general stock price improvements; the overall relative performance worsened slightly.

The performance recorded is shown in the table below.

Table 11

Year		Average Price Change	Average Relative Change %
1992 Floats	to 31.12.92	+23.8	+10.5
	to 31.12.93	+70.4	+24.0

[151] CMBOR ibid p33
[152] CMBOR ibid p33

	to 31.12.94	+62.5	+31.3
	to 31.12.95	+70.0	+16.9
1993 Floats	to 31.12.93	+28.2	+2.1
	to 31.12.94	+3.2	-4.5
	to 31.12.95	+28.2	-1.4
1994 Floats	to 31.12.94	+0.9	+3.0
	to 31.12.95	+15.3	-0.7
1995 Floats	to 31.12.95	+35.5	+25.5

Source-CMBOR ibid p34

Looking at performance characteristics, the best performers (as in 1993) have been medium sized buy-out and buy-in companies- those where the original buy-out or buy-in value was between £l0m and £30m. Clearly, successful deals of this size will have increased their market capitalisation considerably by the time of float, which explains the better performance of buy-outs and buy-ins in 1995 which had an initial market capitalisation of over £30m.

As noted earlier, the average period to float was considerably longer in 1995 than in the previous few years. In 1992 and 1993, although not 1994, the best performers were buy-outs and buy-ins which had taken three or four years to float. This period again produced good performance with companies outperforming relative to the FT-All Share Index by almost a third (31.7 percent).

In both 1992 and 1994 floats where less than 50 percent of the enlarged share capital was offered for sale had performed more satisfactorily than those where more than 50 percent had been offered. This was again the case in 1995.

The increase in buy-ins being floated was accompanied by a sharp reversal of their performance relative to buy-outs. Whereas in 1992/94 buy-ins had outperformed buy-outs, they had a disappointing overall performance in 1995.

Table 12

	1993 floats	1993 floats	1994 floats	1994 floats	1995 floats	1995 floats

	Price Ch.	Rel. Ch.	Price Ch.	Rel. Ch.	Price Ch.	Rel. Ch.
MBO Value						
<£10m	+22.0	+6.5	+5.3	+7.5	+23.8	+11.7
£10m-£30m	+45.8	+0.3	+2.9	+4.9	+76.9	+63.0
£30m+	+22.2	+6.0	-4.4	-2.2	+11.2	+5.7
Mkt Cap. on Float						
<£30m	+25.5	+4.3	+3.1	+3.9	+18.5	+7.7
£30m+	+28.9	+1.4	+0.1	+2.7	+46.5	+37.1
Period to float						
<3yr	+26.9	+9.7	-5.7	-2.9	+32.4	+24.4
3/4 yr	+25.1	+9.5	-0.7	-0.3	+44.9	+31.7
5yr+	+37.1	-28.2	+11.9	+14.7	+24.5	+17.3
% sh. cap. offered						
<50%	+17.1	-0.2	+2.4	+4.2	+39.8	+29.5
>50%	+39.1	+2.2	-0.9	+1.7	+19.8	+11.0
MBO?	+31.3	+12.3	+17.0	+20.1	+7.5	+2.5
MBI?	+27.7	+0.4	-1.0	+1.0	+46.7	+34.7

Source-CMBOR ibid p35

The debate over the longer term performance of floated buy-outs and buy-ins has led to the establishment of an index, the CMBOR Index of buy-out and buy-in floats. This has been sponsored by River & Mercantile.

The CMBOR Index comprises those companies listed on the London Stock Exchange which have previously been subject to a buy-out or buy-in as defined by CMBOR. Companies included are revised daily to include new flotations and to take off companies which have subsequently been subject to some form of second exit. The base date for the CMBOR Index is end 1990 and the Index includes all buyout and buy-in floats which were quoted at that date. The Index has been calculated since July 1995, and on a daily basis since January 1996. Recent results from the index are reported in table form below.

Table 13

	31/12/90 - 31/3/96	31/12/94 - 31/3/96	31/12/94 - 31/12/95	31/12/95 - 31/3/96
CMBOR Index	+118.7	+28.7	+20.1	+7.2
FTSE All Share	+78.6	+21.2	+18.5	+2.3
FTSE Mid 250	+104.8	+23.6	+14.8	+7.6
Hoare Govett Small Cap Index	+79.0	+17.8	+9.7	+7.4

Source-CMBOR ibid p35

As is shown in graph 4 in the graph pack, relative price out-performance has been achieved by the Index since its formation. Between its base date and the end of March 1996, the out-performance relative to the FT All Share Index has been 40.1 percentage points and against the Hoare Govett Smaller Companies Index 39.7 percentage points. For the fifteen months to March 1996, the Index increased by 28.7 percent compared to 17.8 percent for the Hoare Govett Smaller Companies Index.

Recent academic research carried out in the United States by Brav and Gompers[153] mirrors the finding of the results of the Centre for Management Buyout Research. They investigated the long run performance of recent IPO firms in a large sample covering 934 VC backed floats which occurred in the period 1972 - 1992 and 3407

[153] A. Brav and P. Gompers, 'Myth or Reality? The Long Run Underperformance of Initial Public Offerings: Evidence from Venture and Nonventure Capital Back Companies' Journal of Finance Vol LIL No. 5 December 1997 p1791 - 1821

non-venture capital backed floats which occurred in the period 1975 - 1992. They found that venture capital backed IPOs outperform non-venture capital backed IPOs using equally weighted returns. The value weighted returns study shows that the outperformance of the venture capital backed IPOs is a function of the underperformance of small sub $50m non-venture capital backed IPOs.

8.5 Study Methodology and Data

8.5.1 The Study Data

The data used in this study is concerned with initial public offerings made on the Main Market and the Unlisted Securities Market of the London Stock Exchange. The study period spans six years from July 1989 to June 1995.

The dataset was constructed in the following manner. Data on companies floating was obtained from KPMG Corporate Finance, London. The information provided included financial information on floating companies and information on the relevant professional advisors. This information was cross-referenced against information provided by the Quality of Markets Department at the London Stock Exchange for accuracy. Pricing data for the IPO companies was obtained from DataStream International and cross-referenced against a second source courtesy of FactSet Ltd. The initial dataset containing pricing data included some 302 companies.

The final sample consists of 175 companies. Clearly, the sample is smaller than that used for analysis purposes in the previous chapter. This is a function of data availability pertaining to the independent variables used in the econometric analysis.

The average level of excess return achieved by the sample constituents on the first day of trading was 7.9%. This level represents the index adjusted return from the flotation price to the mid-market price at the end of the first day's trading. All flotation methods are considered in the analysis. but as indicated in the Keasey and Short[154] study, the placing method is that most favoured by companies.

The following table indicates the flotation methods chosen by companies.

Method	Number
Placing	109
Placing / Offer for Sale	31
Placing / Intermediaries Offer	33
Offer for Sale	1

[154] Keasey and Short, ibid

Others	1
Total	175

8.5.2 Model and Variables

In the analysis to follow, the level of underpricing is defined as:

$EXRTN_i = [(P_{it}/I_t)/(P_{i0}/I_0)]-1$

Where P_{it} = share price at the close of the t th day of trading

P_{i0}= offer price

I_t = FT All Share Index level at the close of the t th day of trading

I_0 = FT All Share Index level at flotation

Measuring excess returns in this level assumes that the betas of the IPO firms are the same as that of the market as a whole. As previously discussed, this is a strong assumption, but one which has been used previously in the literature.

For the purposes of the study, the immediate excess return was focused upon. To that end the dependent variable is constructed to show excess return on the first day of trading.

For the current sample of 175 firms, the average underpricing on the initial day of trading was 7.9% as indicated. However, the standard deviation of 15.2% is illustrative of the variation in underpricing across the individual firms. The level of 7.9% is lower than reported in recent studies. This may in part be reflected in the relatively large number of sizeable flotations undertaken in the period. (such as the privatisation of the water and regional electricity companies). Over the other periods which were examined (days 5,10,15 and 20) the level of underpricing and standard deviation of returns were broadly similar.

The relevant statistics are shown in the table below.

	Day 1	Day 5	Day 10	Day 15	Day 20
Average Return	7.89%	8.55%	8.05%	8.34%	8.34%
Std. Deviation	15.24%	14.61%	15.22%	14.45%	15.59%

The variables used are shown in the model below.

$$EXRTN = B_0 + B_1.BIG + B_2.MBO + B_3.PBV + B_4.PSAL + B_5.TURNOVER + B_6.NAV + B_7.PRE + B_8.FUNDS + B_9.RETAINED$$

Where the variables are defined as follows

Dependent Variable	Description
EXRTN	Level of excess return
Independent Variables	
BIG	Dummy variable coded 1 where the company was a government privatisation issue or a particularly large flotation
MBO	Dummy variable coded 1 if the new issue was an MBO
PBV	Share price to Book value ratio
PSAL	Share price to sales ratio
TURNOVER	Turnover in the period immediately pre float
NAV	Nav in the period immediately pre float
PRE	Pre-tax profit in the period immediately pre float
FUNDS	Funds raised in the flotation
RETAINED	Percentage of equity retained by shareholders in the float

The focus of this study is to determine any differentiation between the returns produced by MBO firms in the initial post issue period and in addition to determine whether any effect, if indeed one exists, persists for a period of time into the post issue period. For that purpose each study was conducted for a number of different time periods.

The study focused on MBOs in particular and did not include other types of venture capital backed funding structure pre-flotation. This was done for a number of reasons. Firstly, this study sought to add to the literature in the area of MBOs specifically and hence considering MBIs would, to a degree, have confused th picture. One of the aims of the study was to provide evidence specifically to back or contradict the existing literature in respect of the price performance of MBO backed flotations. Secondly, as one of the aims of the study was to search for the possibility of managerial signalling via equity retention, focusing on MBOs, where management teams should have a larger stake in the entity and are less likely to have conducted a successful MBO in the past, (unlike an MBI candidate) should provide a better signal.

The list of explanatory variables used in this study is not the same as for the main study undertaken in chapter seven. Hopefully this passage should explain why it is necessary to change the independent variables.
The changes reflect the fact that MBO businesses normally have certain characteristics which differentiates them from other small IPOs. Namely, they tend to have substantial asset backing (as this is what the MBO debt is secured against) and they tend to be commercially viable (and in that sense profitable, unlike say a Biotech IPO). To that end variables TURNOVER, NAV and PRE attempt to capture these characteristics to determine if there is any share price effect associated with the aforementioned characteristics. Variables PBV and PSAL address similar issues but from a different perspective. These ratios are traditionally used by investors as barometers of 'value' in an IPO. MBO flotations should score highly in this regard and hence the variables are included to see whether there is any share price effect associated with the level of these variables. FUNDS is included in this analysis to determine whether there is a share price reaction associated with an MBO (which will be highly leveraged) raising substantial funds to pay back its debt. The notion here is that if an MBO is capital rationed as a function of its debt burden and the servicing costs thereof, then raising a large sum on flotation to pay this back may be taken as a positive signal by investors that the management will now be able to deploy previously tied up resources into profitable projects.

To discuss each variable individually ,the variable BIG was included in the model to see whether any differential effects in underpricing existed for those much larger issues including government privatisations and in addition to see whether this effect persisted through time. MBO is a dummy variable used to separate the MBOs from the other firms in the dataset. PSAL is a variable which relates the market value of the company to its turnover. The notion behind including this variable is to see whether those companies which have a lower price to sales ratio (and hence may present better 'value') produce higher excess returns. Similarly, the PBV variable relates the market value of the company to its asset value. The notion here is to test whether lower price to book value companies have positive valuation characteristics which produce higher excess returns. TURNOVER, NAV and PRE variables measure sales, assets and profitability of the firms. The inclusion of these variables seeks to show if any relation between these variables and the level of excess returns exists. FUNDS measures the amount of funds raised in the flotation. The idea here is to determine if floats which raise less funds are potentially less risky and hence may exhibit lower degrees of excess returns. RETAINED measures the percentage of funds retained in the company post flotation. The notion here is that less risky firms (which should produce lower excess returns) have high retention levels.

8.5.3 Empirical Methods

The empirical analysis conducted was that of an ordinary least squares regression (OLS) with excess return as dependent variable and the explanatory variables as indicated in the previous section. The models were run on the MicroFit 4 econometrics package.

In the models run where the explanatory variable was excess return 15 and 20 days after flotation, the model was found to suffer from a heteroscedasticity problem. The result of the existence of this problem was that while the parameter estimates were linear and unbiased they were not minimum variance in the class of all unbiased estimators. The absence of the minimum variance criterion places a question on the validity of any inference which can be drawn from the model. As a result, the heteroscedasticity problem had to be solved in some way. The traditional method of solving such a problem is to determine which of the independent variables is causing the variances to be non-constant and then to 'scale' the regression equation to resolve the problem. Unfortunately, in this case such a procedure would be very difficult to accomplish effectively due to the number of independent variables. However, the same result can be achieved by the use of White's heteroscedasticity consistent standard errors. This approach does not attempt to identify the specific cause of the problem but makes an algebraic manipulation to cure the problem. Heteroscedastic consistent parameters are shown for all the models but as intimated, they are only strictly relevant to the last two studies.

8.5.4 Model Results

The regression results are shown below.

	Day 1	Day 5	Day 10	Day 15	Day 20
R Squared	0.075	0.114	0.095	0.070	0.0811
F Statistic	1.476	2.363 *	1.919**	1.3378	1.6186

* - significant at the 5% level

** - significant at the 10% level

The results of the model estimation procedure reveals that both R squared values and F statistics are low. This is not entirely unexpected as high R squared values would mean that it were possible to forecast which stocks would produce high excess returns. Nevertheless, the low values do mean that the level of security which can be attached to inference from the parameter estimates is modest. The individual parameter results are discussed below.

Summary Parameter Results

Regressor	Day 1	Day 5	Day 10	Day 15	Day 20
BIG	NO	NO	NO	NO	YES (10%)
MBO	YES (10%)	YES (5%)	NO	NO	NO
PBV	NO	YES (10%)	YES (10%)	YES (5%)	YES (10%)
PSAL	NO	NO	NO	NO	NO
TURNOVER	NO	NO	NO	NO	NO
NAV	NO	YES (10%)	NO	NO	NO
PRE	NO	NO	NO	NO	NO
FUNDS	NO	NO	NO	NO	NO
RETAINED	NO	YES (5%)	NO	NO	NO

Model Parameter Results (Full Statistics in Statistical Appendices)

Day One Returns

Ordinary Least Squares Estimation

****

Dependent variable is ADJ1

175 observations used for estimation from 1 to 175

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
BIG	-.031293	.12987	-.24096[.810]
MBO	-.046261	.025673	-1.8019[.073]
PBV	.3152E-3	.2454E-3	1.2843[.201]
PSAL	.4768E-4	.6059E-3	.078692[.937]
TURNOVER	.7582E-7	.2188E-6	.34651[.729]
NAV	-.2537E-6	.2512E-6	-1.0096[.314]
PRE	.1668E-5	.1863E-5	.89560[.372]
FUNDS	-.1253E-6	.4115E-6	-.30459[.761]
RETAINED	.10893	.069959	1.5570[.121]
CONST	.031802	.043966	.72334[.470]

****

Week One Returns

Ordinary Least Squares Estimation

****

Dependent variable is ADJ5

175 observations used for estimation from 1 to 175

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
BIG	-.089826	.12177	-.73766[.462]
MBO	-.051795	.024073	-2.1516[.033]
PBV	.4912E-3	.2301E-3	2.1346[.034]
PSAL	.4864E-3	.5681E-3	.85621[.393]
TURNOVER	.8855E-7	.2052E-6	.43162[.667]
NAV	-.2177E-6	.2356E-6	-.92411[.357]
PRE	.1560E-5	.1747E-5	.89321[.373]
FUNDS	.3393E-7	.3858E-6	.087942[.930]
RETAINED	.12878	.065599	1.9631[.051]
CONST	.019610	.041226	.47567[.635]

****

Week Two Returns

Ordinary Least Squares Estimation

****

Dependent variable is ADJ10

175 observations used for estimation from 1 to 175

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
BIG	-.14512	.12827	-1.1314[.260]
MBO	-.038324	.025358	-1.5113[.133]
PBV	.5109E-3	.2424E-3	2.1073[.037]
PSAL	.6111E-3	.5984E-3	1.0212[.309]
TURNOVER	.6537E-7	.2161E-6	.30246[.763]
NAV	-.1147E-6	.2482E-6	-.46240[.644]
PRE	.2017E-5	.1840E-5	1.0960[.275]
FUNDS	.7066E-7	.4064E-6	.17385[.862]
RETAINED	.11892	.069101	1.7210[.087]
CONST	.012521	.043426	.28832[.773]

Week Three Returns

Ordinary Least Squares Estimation

****

Dependent variable is ADJ15

175 observations used for estimation from 1 to 175

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
BIG	-.12889	.12345	-1.0441[.298]
MBO	-.033754	.024405	-1.3831[.169]
PBV	.4524E-3	.2333E-3	1.9389[.054]
PSAL	.2377E-3	.5759E-3	.41280[.680]
TURNOVER	.8453E-7	.2080E-6	.40640[.685]
NAV	-.1065E-6	.2388E-6	-.44583[.656]
PRE	.1637E-5	.1771E-5	.92439[.357]
FUNDS	.118E-6	.3911E-6	.28586[.775]
RETAINED	.099429	.066504	1.4951[.137]
CONST	.023249	.041794	.55628[.579]

Week Four Returns

Ordinary Least Squares Estimation

****

Dependent variable is ADJ20

175 observations used for estimation from 1 to 175

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
BIG	-.16782	.13233	-1.2682[.207]
MBO	-.033369	.026159	-1.2756[.204]
PBV	.5951E-3	.2501E-3	2.3796[.018]
PSAL	-.7680E-4	.6173E-3	-.12440[.901]
TURNOVER	.8269E-7	.2229E-6	.37088[.711]
NAV	-.6680E-7	.2560E-6	-.26094[.794]
PRE	.1964E-5	.1898E-5	1.0345[.302]
FUNDS	.9900E-7	.4193E-6	.23612[.814]
RETAINED	.10266	.071285	1.4402[.152]
CONST	.024659	.044799	.55044[.583]

8.5.5 Discussion of Results

From the panel of results as presented above the following conclusions can be drawn. The results with respect to the MBO variable are most interesting. The variable is significant over the first two observation periods but is in fact signed negatively. This is indicative of MBOs exhibiting lower levels of excess return in the immediate aftermarket. The variable ceases to have any significance over other time scales.

This result would seem to stack up against the earlier anecdotal evidence that MBO firms outperform the universe of other flotations. However, in this context it must be noted that even though the time frame of the study extends to twenty days of trading into the after-market, this in itself is not that long a time window. It may well be that the MBOs do outperform over longer (six months) time periods but this effect is not captured by the dataset used in this study.

Interestingly, MBOs are appearing to exhibit lower excess return in the immediate aftermarket. This phenomenon may well be explainable in terms of the signalling literature discussed earlier in this thesis.

As mentioned in the preceding sections of this chapter, venture capitalists spend a great deal of time vetting potential investments before actually committing funds. In that sense they may, by investing in the first place, be sending a credible signal to the equity investors who subsequently invest in the MBO on listing that the investment is of 'high' quality. In the same way that using a high reputation sponsor is purported to act as a signal of potential investment quality (and hence lower excess return), being a former MBO may produce the same net effect. This postulation would explain the results as found.

There is a precedent in the academic literature for these findings. Megginson and Weiss[155] found in their study of venture capital backed IPOs undertaken in the 1983 1987 period that venture capitalist backing reduced the mean and median level of underpricing associated with these flotations. They take this result as evidence to support their theory that venture the presence of venture capitalists acts as a certification mechanism to potential investors in the same way as certification which

[155] W. Megginson and K. Weiss, 'Venture Capitalists Certification in Initial Public Offerings' Journal of Finance Vol XLVI No. 3 July 1991 p879 - 903

can be undertaken through the use of high reputation bankers and accountants. They add to the strength of their argument by observing that the venture capital backed firms were more successful in attracting high reputation banks and accountants to handle their issue.

To discuss the other findings in brief, the most prevalent finding is that the PBV variable is significant over a number of time periods. This would point to shares with a higher asset backing producing a higher level of excess returns. This would be consistent with investments which exhibit better 'value' characteristics producing larger excess returns in the aftermarket. The fact that the first day result was negative may point to the gradual buying interest in these stocks increasing over time.
The final result to comment upon relates to the fact that the dummy variable representing the government privatisation issues produced a statistically positive result for the last time period in the study. This indicates abnormal excess returns from such stocks, but only after some time.

8.6 Conclusion

This chapter has sought to examine the venture capital market in the UK with particular emphasis on MBO flotations. The results of the study contained in section four of this chapter do not square entirely with the evidence introduced earlier. It would appear that the phenomenon of outperformance from venture capital backed flotations was not evidenced by the results. This may be due to the relatively short time period over which the data set produced data but nevertheless, the results stand. The potential reasons for this observed result may have a great deal to do with the 'signalling' of underlying IPO quality alluded to in earlier work. What is interesting to note is that while the presence of a venture capitalists via his/her involvement in an MBO acts as a positive signal to investors by apparently reducing uncertainty over the prospects for the business and the associated level of excess return, the use of a highly reputable sponsor appears to have no such effect, at least in this case.

The evidence presented from work into longer term returns from MBOs (and indeed MBIs) indicates that they do produce excess returns relative to other asset classes. This in fact does tie in with the scenario outlined. It would be consistent for 'high quality' IPOs to produce low immediate excess returns in accordance with the signalling effect but for these investments to produce better long term returns as a function of their higher quality.

8.7 Venture Capital Graph Pack

Figure 3: Companies using UK Venture Capital

Source: BVCA

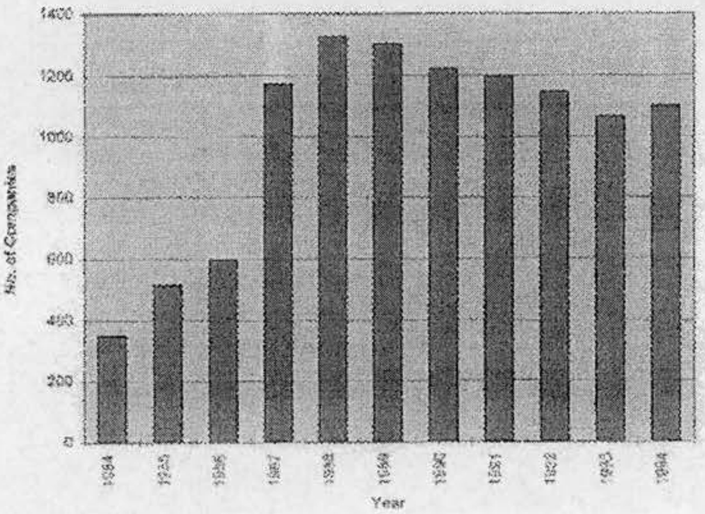


Figure 4: UK Venture Capital Investment

Source: BVCA

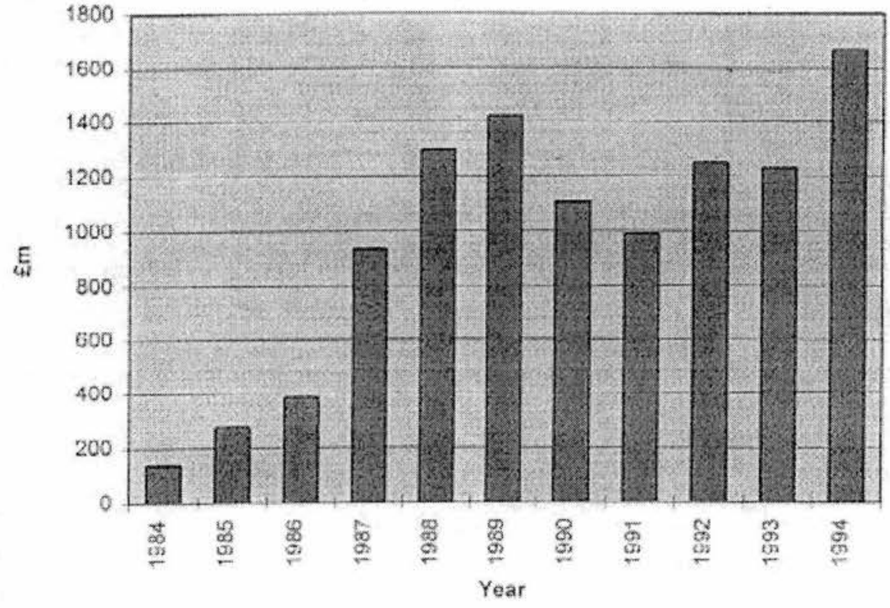


Figure 10: Total Transaction Value of UK MBOs

Source: Centre for Management Buy-Out Research

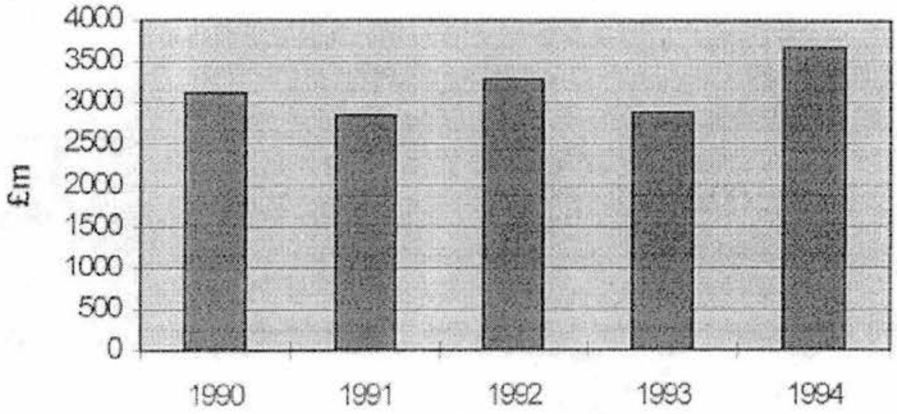


Figure 11: UK MBOs and total M & A activity

Source: Centre for Management Buy-Out Research

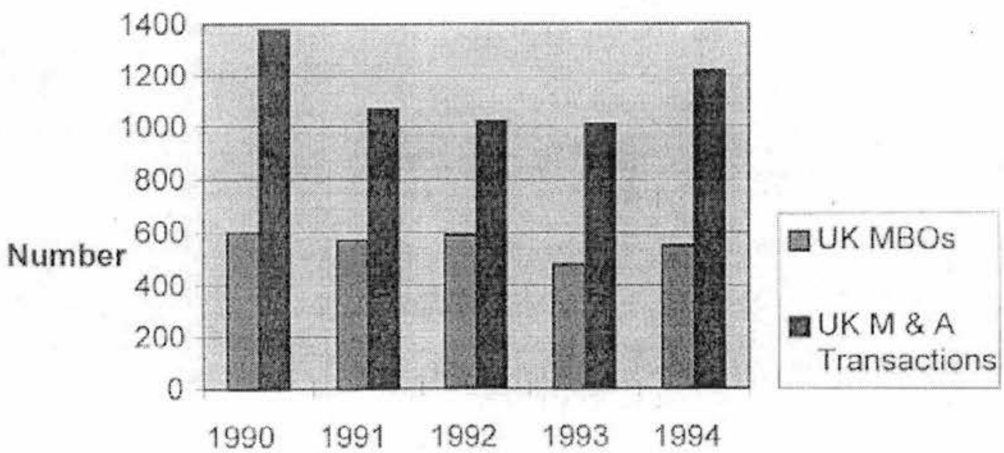
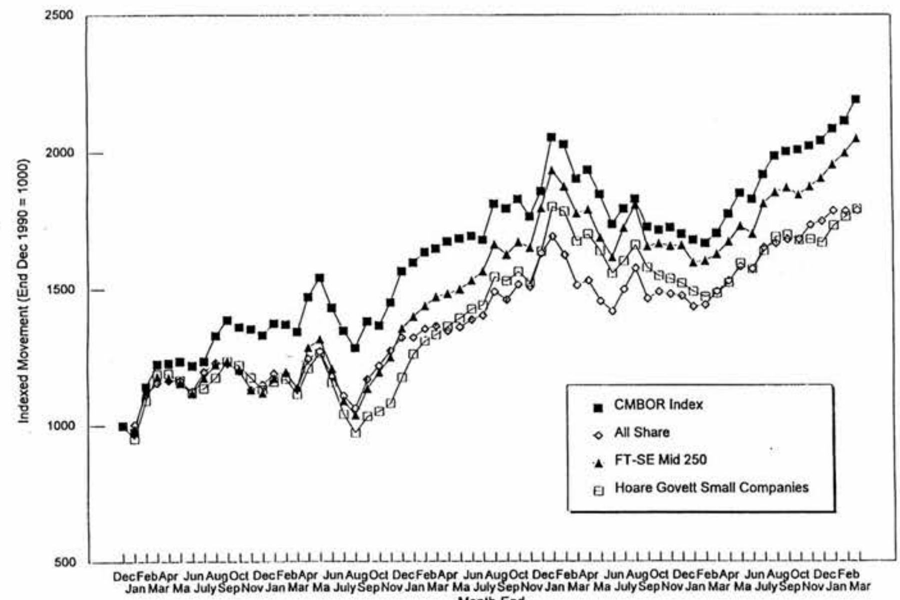


Figure 3.1: Performance of the CMBOR Index against other indices (1991-March 1996)
(FT-SE All Share, FT-SE Mid 250 & Hoare Govett Small Companies indices)



Source: CMBOR/River & Mercantile

Conclusions

This thesis concerned itself with an examination of the market for Initial Public Offerings in the United Kingdom. This is the mechanism by which corporate entities gain a listing on London's quoted equity markets. Equity markets are dynamic, continually evolving with the passing of time, but what remains an all pervasive fact is that investing in IPO companies appears to produce an excess return on average to investors regardless of which international equity market the issue is listed upon or indeed over which period in time one cares to look at.

This study concerns itself with the United Kingdom IPO market where work on the phenomenon goes back to that undertaken by Merrit, Howe and Newbould in the latter half of the 1960's. They found that the average excess return across issues in their sample was 13.7%. Subsequent UK based studies have re-affirmed this finding with the absolute level of excess return being somewhat variable between studies (such as those conducted by Levis and Holland and Horton) but continually in the 10% range.

A broadly similar level of excess return has been found to persist in the considerably more voluminous body of evidence provided by the many American financial economists who have focused on this issue.

This thesis has sought to investigate this phenomena. Firstly the presence or not of the phenomena is identified for the data set used, a theoretical explanation for its existence having been drawn from the literature. Once the excess return levels have been identified as existing in the dataset at hand, further work to examine some of the more interesting aspects of the anomaly is introduced and discussed.

Before these discussions are commenced and the empirical work undertaken, the institutional features of the UK IPO market are introduced. The work in this area can be found in chapters one to four. It is hoped that by reading this material the reader will be aware of the highly complex dynamics of the UK IPO market, the many players involved and the myriad of complex issues that must be considered by a company attempting a flotation. As is clear from the work in these four chapters the process is complex. It is also continually evolving. Perhaps the most significant development to have taken place since work on this project began has been the creation of the Alternative Investment Market (AIM). This has now replaced the Unlisted Securities Market (USM) and the s535 listing (the latter having been replaced by the creation of Ofex). This market aims to draw smaller more embryonic companies to it by allowing them to achieve a listing while having a shorter trading history than main market flotations and at a lower cost. This market has been relatively successful in attracting a number of new companies onto the market.

Outwith the advent of AIM, changes have been made to the rules governing the main UK market. Principally these relate to the virtual disappearance of the Intermediaries Offer as a means of achieving a flotation. This has been made more or less defunct due to a change in the maximum amount (by value) that can be raised by a company in a traditional institutional placing. This means that even more IPOs arrive on the market via the placing route and hence fewer and fewer private individuals gain access to IPOs when they float.

As previously alluded to, there is a considerable amount of literature which looks at the phenomenon of IPOs excess returns. The bulk of the literature originates in the USA where the subject has been studied for forty years or more. The UK literature is more embryonic in its nature but much of it follows the same lines as the work carried out in the USA. There have been a great many theses advanced to try to explain the observed phenomena. Asymmetric information, Signalling, Ex-Ante Uncertainty, Cascades, Stabilisation and Implicit Insurance are all notions advanced in the literature. There are pro's and con's to almost every approach, evidence for and against. These are all discussed in some detail in chapter five.

This thesis concerns itself, in the first instance, by examining the data set to attempt to test for the presence of 'stabilisation'. This explanation for IPO excess returns has

been researched quite extensively in the USA by authors such as Ruud and Shultz and Zaman, but to date little work has been done in the UK.
Stabilisation is an intuitively appealing explanation for IPO excess returns. It is not based on any pre-conceived notions of the operations of the investment banking industry nor any notion indirect compensation between agents. It is an intuitively simple explanation which has to it's great advantage the fact that it can be transferred across markets. A number of the other explanations are predicated on certain institutional features of the markets in which the research studies were focused. This makes for fundamental results which are, by virtue of their lack of portability between markets, less satisfactory. 'Stabilisation' has the advantage of portability. Consequently, chapter six concentrates on examining the data base to search for the presence of stabilisation in the returns of UK IPOs in the 1989-1995 period.

Compelling evidence to support the presence of stabilised returns in the UK IPO market over that period is presented. It would appear that the initial day one excess return of 8.4% is a result of stabilising activities by investment banks. The level of this stabilisation broadly declines over time, consistent with investment banks ceasing stabilising activities. In this way this research provides evidence in favour of stabilisation as an explanation of IPO excess returns in the UK.

This fact having been established, this thesis then moves on to examine a number of features of the UK IPO market. Chapter seven specifically examines 'signalling' in the context of the UK IPO market. The notion of this research is to examine whether there is any differential excess return between IPOs using 'high' or 'low' quality sponsoring bankers. The literature would suggest that higher 'quality' investment bankers should frank their reputation on the IPOs that they float hence reducing the indirect cost of flotation (as witnessed by the level of excess returns). The evidence presented in chapter seven allows no weight to be added to this argument. It appears that there is not an indirect cost advantage from using a high quality sponsoring investment bank. With this in mind, further work on IPO costs is conducted in chapter seven. The notion behind this work is to look at direct costs of flotation (the fact that choosing a high reputation sponsor does not reduce indirect costs having been established) to determine if there is a point (measured in terms of funds raised) below which IPO companies should not concern themselves with appointing a 'high' quality sponsor. Such a point, where company's raise approximately £30m, is so identified.

This is an interesting revelation. It points to the fact that 'smaller' IPOs should use 'lower' quality brokers to minimise their flotation costs. This points to a rosy future indeed for the newly created AIM market whose characteristics fit this scenario well.

The final research chapter is chapter eight. This chapter looks at the phenomenon of venture capital backed flotations, and management buy-out flotations in particular. This topic is of increasing interest due to the ever increasing number of venture capital backed flotations that are listing on the London market. The chapter introduced the subject of venture capital in some detail as it is quite dissimilar in some ways to the subjects introduced earlier in this thesis.

The literature on MBO backed flotations suggests that they provide useful share price outperformance relative to all other IPOs. Consequently, this study looks MBO flotations in the 1989-1995 period to determine if any differential excess return can be identified in the aftermarket. No such evidence can be found from the dataset used. It appears that there is no differential excess return in the immediate aftermarket for MBO backed flotations. This result runs somewhat contrary to that presented in the current literature but is consistent with the 'signalling' study conducted in chapter seven. The result points to MBO floats producing a level of excess return commensurate with those floats signalling their 'quality' through having attracted the interests of a venture capital investor in the past.

It appears then that while the appointment of high quality sponsors does not reduce ex-ante uncertainty, the fact that the investee company has been venture capital backed does.

In conclusion then we may draw the following results from the study. Firstly, the UK IPO market is a complex and dynamic environment in which a great many new companies seek a listing each year. Excess returns exist and appear to be caused, at least in part, by stabilising activities conducted by investment bankers which decline over time. Appointment of 'high' quality sponsoring investment bank does not appear to reduce the indirect costs of underpricing and in addition, smaller IPOs could save themselves considerable direct costs by not appointing a 'high quality' sponsor. Finally, no evidence can be found to suggest that MBO floats produce excess returns in the immediate after-market. However, the evidence found in connection with MBO floats is consistent with MBO floats 'signalling' high quality (and hence having lower levels of excess returns) as a function of having attracted venture capital backers.

The topic of IPOs is a huge one and no thesis could possibly hope to cover more than a small piece of a puzzle which remains unsolved. This piece of work is no exception. It focuses on a relatively small part of the UK IPO market but it does offer some new insights into the dynamics of that market. Any amount of further research could be undertaken. One area of interest with regard to 'stabilisation' would be to look at the structure of the stabilising activities to see if the sponsoring broker plays the major role. One would expect this to be the case but lack of data availability may make this a difficult task. A particularly fruitful area of research might examine the longer term (2 year) post IPO performance of IPO firms. Since that topic was never intended for study in this thesis, a discussion of the longer term returns from investing in IPOs is limited to the literature review. However, an examination of the long term IPO returns, particularly in the area of venture capital backed flotations, could provide fruitful indeed.

From the point of view of the author this thesis has represented an enjoyable journey through an interesting and challenging area. The journey was sometimes difficulty and often frustrating but having arrived at journey's end, very satisfying.

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HSBC James Capel, London

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Statistical Appendices

Index to Statistical Appendices

Results of Survey conducted by Consensus Research International into Top Flotation Advisors 1989-1995[1]
Data used in Chapter Seven

Sponsor Reputation Data

Year	1995
Rank	
1	SBC WARBURG
2	SCHRODERS
3	KLEINWORT BENSON
4	DEUTSHE MORGAN GRENFELL
5	GOLDMAN SACHS
6	BZW
7	ROTHSCHILDS
8	LAZARDS
9	NATWEST
10=	BARINGS
10=	FLEMINGS
12=	HAMBROS
12=	UBS
	HILL SAMUEL
14=	
14=	JP MORGAN
14=	MORGAN STANLEY

Sponsor Reputation Data

Year	1994
Rank	
1	SG WARBURG
2	SCHRODERS
3	KLEINWORT BENSON
4	MORGAN GRENFELL
5	BARINGS
6	GOLDMAN SACHS
7	LAZARDS
8	BZW
9	ROTHSCHILDS
10	HAMBROS
11	FLEMINGS
12	UBS
13	NATWEST
14	MAORGAN STANLEY
15	JP MORGAN

[1] Source - Consensus Research International, London

Sponsor Reputation Data

Year	1993
Rank	
1	SG WARBURG
2	SCHRODERS
3	KLEINWORT BENSON
4	MORGAN GRENFELL
5	LAZARDS
6	BARINGS
7	BZW
8	GOLDMAN SACHS
9	ROTHSCHILDS
10	HAMBROS
	NATWEST
11	
12	FLEIMINGS
13	JP MORGAN
14	MORGAN STANLEY
15	SAMUEL MONTAGU

Sponsor Reputation Data

Year	1992
Rank	
1	SG WARBURG
2	SCHRODERS
3=	KLEINWORT BENSON
3=	LAZARDS
5	BZW
6	MORGAN GRENFELL
7	ROTHSCHILDS
8	BARINGS
9	GOLDMAN SACHS
10	NATWEST
11	HAMBROS
12	FLEMINGS
13	HILL SAMUEL
14	MORGAN STANLEY
15=	SAMUEL MONTAGU
15=	JP MORGAN

Sponsor Reputation Data

Year	1991
Rank	
1	SG WARBURG
2	SCHRODERS
3	KLEINWORT BENSON
4	LAZARDS
5	BZW
6	BARINGS
7	GOLDMAN SACHS
8	MAORGAN GRENFELL
9=	NATWEST
9=	ROTHSCHILDS
11	FLEMINGS
12=	HAMBROS
12=	SAMUEL MONTAGU
14	HILL SAMUEL
15	MORGAN STANLEY

Sponsor Reputation Data

Year	1990
Rank	
1	SG WARBURG
2	SCHRODERS
3	KLEINWORT BENSON
4	LAZARDS
5	BZW
6	BARINGS
7	GOLDMAN SACHS
8	MORGAN GRENFELL
9	NATWEST
10	ROTHSCHILDS
11	FLEMINGS
12	HAMBROS
13	SAMUEL MONTAGU
14	HILL SAMUEL
15	MORGAN STANLEY

Sponsor Reputation Data

Year	1989
Rank	
1	SG WARBURG
2	SCHRODERS
3	KLEINWORT BENSON
4	MORGAN GRENFELL
5	LAZARDS
6	BZW
7	GOLDMAN SACHS
8	SAMUEL MONTAGU
9	ROTHSCHILDS
10	BARINGS
11	NATWEST
12	MORGAN STANLEY
13	UBS
14	CSFB
14=	HAMBROS

Statistical Material relating to Chapter Six

Returns Matrix From The Stabilisation Study

Company Name	**Day 1 Raw % Return**	**Daw 5 Raw % Return**	**Day 10 Raw % Return**	**Day 15 Raw % Return**	**Day 20 Raw % Return**
HILL HIRE	0.03	0.08	0.08	0.09	0.0
MICE GROUP	0.08	0.08	0.08	0.08	0.0
BSKYB	0.05	0.00	0.01	-0.04	-0.0
INNOVATIVE TECHNOLOGIES	0.02	0.02	0.02	0.02	0.0
RM PLC	0.18	0.16	0.16	0.16	0.1
RAP GROUP	0.02	-0.03	-0.03	-0.03	-0.0
CLYDEPORT	0.13	0.22	0.22	0.23	0.2
KILN CAPITAL	0.00	0.01	0.00	0.01	0.0
TELEWEST COMMUNICATIONS	0.02	0.03	0.01	-0.01	-0.0
EUCLIDIAN	0.02	0.02	0.02	0.02	-0.0
ASHBOURNE	-0.02	0.01	0.01	-0.01	-0.0
SEAPERFECT	0.04	0.18	0.11	0.07	0.0
JJB SPORTS	0.07	0.07	0.07	0.06	0.0
TELE-CINE CELL	0.00	-0.01	-0.03	-0.03	-0.0
TLG	0.08	0.09	0.08	0.15	0.1
CHURCHILL CHINA	0.02	0.02	0.02	0.02	0.0
REGENT CORPORATION	0.04	0.07	0.04	-0.04	-0.1
CALLUNA	0.29	0.28	0.43	0.33	0.3
IRISH PERMANENT	0.18	0.16	0.19	0.20	0.1
FILTRONIC COMTEK	0.10	0.25	0.34	0.36	0.3
SERVISAIR PLC	0.02	0.08	0.07	0.07	0.1
ED AND F MAN	-0.05	-0.03	-0.09	-0.09	-0.0
GAMES WORKSHOP GROUP	0.05	0.08	0.09	0.09	0.0
ENNEMIX	0.08	0.06	0.06	0.06	0.0
MACKIE INTERNATIONAL GROUP	0.01	-0.01	-0.04	-0.04	-0.0
RYLAND GROUP	0.06	0.06	0.02	0.02	0.0
COMPEL GROUP PLC	0.01	-0.05	-0.07	-0.10	-0.1
INDEPENDENT PARTS GROUP	0.07	0.06	0.07	0.07	0.0
COPYRIGHT PROMOTIONS	0.02	0.02	0.05	0.04	0.0
CHAMBERLIN PHIPPS GROUP	0.03	0.03	0.02	0.01	0.0
PILLAR PROPERTY	0.00	0.01	0.03	0.03	0.0
AROMASCAN	0.00	-0.02	-0.05	-0.06	-0.0
MAGNUM POWER	-0.06	0.05	0.03	0.05	0.4
PANTHER SECURITIES CO	0.00	-0.02	-0.02	-0.05	-0.0
FREEPORT LEISURE	0.07	0.07	0.07	0.07	0.0
IDEAL HARDWARE	0.12	0.23	0.22	0.22	0.2
YATES BROTHERS WINE LODGES	0.16	0.17	0.17	0.25	0.2
EXCO	0.13	0.13	0.12	0.16	0.1
FINELIST	0.03	0.01	0.00	0.03	0.0
CARNELL PLC	0.37	0.41	0.44	0.44	0.4
EURODOALLAR	0.01	0.00	0.02	0.02	0.0
VIDEOLOGIC GROUP	-0.04	-0.18	-0.37	-0.12	-0.1
UNIVERSAL CERAMIC MATERIALS	0.02	0.05	0.10	0.19	0.2
JBA HOLDINGS	0.02	0.02	0.01	0.01	0.0
JOHN MANSFIELD GROUP	0.00	0.08	0.08	0.08	0.0
CHESTERTON INTERNATIONAL	0.00	0.07	0.06	0.06	0.1
BLOOMSBURY PUBLISHING	0.05	0.05	0.07	0.08	0.1

CPL AROMAS	0.06	0.06	0.05	0.05	0.0
VCI	-0.06	-0.07	-0.14	-0.11	-0.0
UPF	0.10	0.11	0.11	0.11	0.2
AMEY HOLDINGS	0.01	0.02	0.02	0.02	0.0
SPARGO CONSULTING	0.13	0.17	0.16	0.11	0.1
BREWIN DOLPHIN HOLDINGS	0.00	0.00	-0.01	-0.08	-0.1
AEROSTRUCTURES HAMBLE	0.00	0.02	0.02	-0.01	-0.0
ARGENT	0.04	0.03	0.03	0.00	0.0
LONDON CLUBS	0.10	0.13	0.14	0.12	0.1
CASSELL	0.05	0.08	0.17	0.16	0.1
THE DENBY GROUP	0.05	0.04	0.06	0.07	0.0
ITERMEDIATE CAPITAL GROUP	0.01	0.02	0.03	0.03	0.0
AUTOMOTIVE PRECISION HOLDINGS	0.06	0.08	0.08	0.06	0.0
CLS HOLDINGS	-0.01	-0.03	-0.04	-0.04	-0.0
KAY'S FOOD GROUP	0.10	0.00	0.05	0.05	0.0
NORCOR	0.06	0.07	0.06	0.07	0.0
NIGHTFREIGHT	0.06	0.02	0.00	-0.02	-0.0
SPECIALITY SHOPS	0.02	0.02	0.02	0.01	0.0
DCC	4.41	4.39	4.34	4.33	4.3
LOMBARD INSURANCE GROUP	-0.01	0.00	0.00	-0.01	-0.0
HEALTHCALL	-0.01	-0.07	-0.09	-0.10	-0.0
CAPITOL GROUP	0.06	0.12	0.13	0.08	0.1
REDROW GROUP	-0.05	-0.06	-0.09	-0.12	-0.1
VYMURA	0.03	0.06	0.06	0.08	0.0
MY KINDA TOWN	-0.03	-0.07	-0.05	-0.09	-0.0
GO AHEAD GROUP	0.00	0.04	0.02	0.02	0.0
HAMLEYS	-0.02	-0.02	0.00	0.00	-0.0
DRS	0.01	0.04	0.01	0.09	0.0
GRT BUSES	0.05	0.04	0.03	0.02	0.0
KELLER	0.70	0.67	-0.03	-0.02	-0.1
OXFORD MOLECULAR	0.05	-0.06	-0.15	-0.16	-0.1
SUPERSCAPE VR PLC	0.28	0.26	0.16	0.17	0.1
FISCAL PROPERTIES	-0.04	-0.03	0.03	0.03	-0.0
ST JAMES BEACH HOTEL	0.10	0.09	0.09	0.09	0.0
RUGBY ESTATES	0.00	0.01	0.02	0.15	0.1
HOUSE OF FRASER	0.04	0.05	0.01	0.05	-0.0
PERSONA	0.04	0.04	0.07	0.10	0.1
GROUPE CHEZ GERARD PLC	-0.01	0.01	0.01	0.01	0.0
UNIPALM GROUP PLC	0.31	0.24	0.37	0.32	0.3
TRAFFICMASTER	0.14	0.46	0.43	0.35	0.3
WAINHOMES PLC	-0.04	-0.08	-0.06	-0.07	-0.0
NOTTINGHAM GROUP PLC	0.01	0.01	0.00	0.00	0.0
INSPEC GROUP PLC	0.18	0.22	0.22	0.22	0.2
CAPITAL SHOPPING CENTRES	-0.10	-0.07	-0.04	-0.03	-0.0
DOMNIC HUNTER PLC	0.11	0.11	0.12	0.14	0.1
DOMINION ENERGY PLC	0.09	0.09	0.09	0.00	0.0
COAL INVESTMENTS PLC	0.23	0.12	0.12	0.11	0.0
ROBERT WISEMAN DAIRIES	0.02	0.01	0.01	-0.01	-0.0
BEAZER HOMES PLC	-0.02	-0.03	-0.02	0.02	0.0
MAID PLC	-0.08	-0.23	-0.40	-0.40	-0.4
NEWPORT HOLDINGS	0.03	-0.02	-0.11	0.01	0.0
BRIGHTSTONE PROPERTIES PLC	0.02	0.01	0.01	0.01	0.0
MDIS	-0.01	-0.04	-0.06	-0.01	0.0

WELLINGTON HOLDINGS PLC	0.07	0.06	0.08	0.08	0.0
PARTCO GROUP PLC	0.11	0.10	0.11	0.12	0.1
MIDLAND INDEP. NEWSPAPERS	0.21	0.16	0.17	0.19	0.2
APPLIED DISTRIBUTION PLC	0.02	-0.01	-0.01	-0.01	-0.0
WASTE RECYCLING GROUP	0.35	0.28	0.25	0.23	0.3
GRAHAM GROUP PLC	0.10	0.12	0.14	0.13	0.1
CEDARDATA PLC	0.09	0.03	0.01	0.00	0.0
GOLDSBOROUGH HEALTHCARE PLC	0.00	-0.01	-0.01	-0.13	-0.1
UNITED CARRIERS GROUP	0.04	0.04	0.03	0.01	0.0
RADSTONE TECHNOLOGY PLC	0.05	0.03	-0.07	-0.06	-0.1
FINELIST GROUP PLC	-0.04	-0.06	-0.08	-0.04	-0.0
TRING INTERNATIONAL GROUP	0.16	0.12	0.10	0.09	0.0
CLINICAL COMPUTING	0.33	0.21	0.22	0.14	0.1
TRIFAST PLC	0.07	0.07	0.05	0.04	0.0
PARKSIDE INTERNATIONAL PLC	0.12	0.13	0.05	0.07	0.0
CHIROSCIENCE PLC	0.01	0.01	-0.01	-0.01	-0.0
ALPHA AIRPORTS PLC	0.20	0.20	0.16	0.17	0.1
CODA GROUP PLC	0.12	0.11	0.10	0.09	0.0
UTILITY CABLE PLC	0.03	-0.08	0.16	0.22	0.1
SLIMMA PLC	0.16	0.17	0.17	0.15	0.1
CEMENTONE PLC	0.16	0.24	0.24	0.26	0.3
RACKWOOD MINERAL HOLDING S PLC	0.14	0.10	0.12	0.12	-0.0
ROSSMOUNT PLC	0.10	0.14	0.10	0.10	0.1
CHELSFIELD PLC	0.15	0.16	0.19	0.16	0.1
SEC PLC	0.03	0.03	0.02	0.13	0.1
NELSON HURST PLC	0.02	0.05	0.06	0.10	0.1
LONDON INDUSTRIAL PLC	0.04	0.08	0.10	0.10	0.1
INSPIRATIONS PLC	0.07	0.06	0.04	0.04	0.0
TELSPEC	0.12	0.24	0.17	0.18	0.2
MILLGATE PLC	0.05	0.02	0.00	0.00	0.0
ON DEMAND INFORMATION PLC	0.41	0.36	0.33	0.28	0.3
CELLTECH GROUP PLC	-0.08	-0.11	-0.11	-0.11	-0.1
FENCHURCH PLC	-0.02	-0.01	-0.03	-0.06	-0.0
BADGERLINE GROUP PLC	0.00	-0.01	-0.05	-0.04	0.0
LILLPUT PLC	-0.08	-0.07	-0.10	-0.12	-0.1
BIOTRACE INTERNATIONAL	0.12	0.11	0.15	0.14	0.1
RUBEROID PLC	0.08	0.11	0.08	0.12	0.1
AZLAN GROUP PLC	0.05	0.11	0.11	0.12	0.1
HOZELOCK GROUP PLC	0.00	0.00	0.02	0.00	0.0
D.F.S. FURNITURE CO PLC	0.04	0.08	0.13	0.15	0.1
LITHO SUPPLIES	0.01	0.03	0.08	0.10	0.1
INDEPENDENT INSURANCE GROUP PLC	0.00	0.22	0.23	0.22	0.2
GARTMORE PLC	0.01	0.02	0.10	0.09	0.1
CANADIAN PIZZA PLC	-0.01	-0.04	-0.04	-0.08	-0.0
TOWRY LAW PLC	0.03	-0.03	-0.04	0.00	0.0
ALLDERS PLC	0.08	0.08	0.09	0.12	0.1
CHARLES SIDNEY PLC	0.00	-0.03	-0.05	-0.05	-0.0
THE ROXBORO GROUP PLC	-1.26	-1.25	-1.26	-1.26	-1.2
ABACUS GROUP PLC	0.15	0.15	0.15	0.15	0.1
EMERALD ENERGY LTD	0.22	0.41	0.56	0.69	0.5
CREST PACKAGING LEISURE	0.04	0.01	-0.01	-0.01	0.0
CENTRE GOLD PLC	0.29	0.22	0.18	0.16	0.2
BSM GROUP PLC	0.02	0.00	-0.04	-0.06	-0.0

CANTAB PHARMACEUTICALS PLC	0.02	-0.02	-0.02	-0.06	-0.0
SCOTIA HOLDINGS PLC	-1.00	0.04	0.03	0.02	-0.0
VIRTUALITY GROUP PLC	0.53	0.54	0.51	0.43	0.4
HAMLET GROUP PLC	0.05	0.05	0.04	0.02	0.0
SHIELD DIAGNOSTICS GROUP	0.04	-0.01	-0.02	-0.13	-0.0
BAKYRCHIL GOLD	0.18	0.14	0.16	0.09	0.0
FLYING FLOWERS	0.12	0.17	0.17	0.23	0.2
SHARELINK INVESTMENT SERVICES	0.14	0.14	0.23	0.32	0.3
QUADRAMATIC PLC	0.04	0.05	0.04	0.06	0.1
COURT CAVENDISH GROUP	-0.11	-0.20	-0.13	-0.17	-0.1
POLICY PORTFOLIO LTD	0.04	0.12	0.11	0.11	0.1
FIELD GROUP	0.74	0.75	0.77	0.76	0.7
CELSIS INTERNATIONAL	0.67	0.69	0.69	0.69	-0.0
BUSINESS POST GROUP	0.06	0.12	0.18	0.18	0.1
DEVRO INTERNATIONAL	0.13	0.13	0.12	0.12	0.1
ENVIRONMED	0.19	0.12	0.13	0.13	0.1
METROTECT INDUSTRIES	0.29	0.26	0.25	0.24	0.2
ANAGEN PLC	-0.15	-0.05	-0.11	-0.11	-0.2
CARPETRIGHT	0.11	0.13	0.11	0.11	0.1
CRABTREE GROUP	0.31	0.30	0.36	0.44	0.4
NORTHERN IRELAND ELECTRICITY	0.11	0.11	0.14	0.17	0.1
FINE DECOR	0.91	0.92	0.95	0.95	0.9
AG HOLDINGS	0.25	0.25	0.18	0.26	0.2
QUALYE MUNRO HOLDINGS	0.10	0.16	0.15	0.13	0.1
RJB MINING	-0.07	-0.05	-0.10	-0.10	-0.1
INVERESK PLC	0.14	0.10	0.13	0.13	0.1
OGC INTERNATIONAL	-0.06	-0.02	-0.01	-0.04	-0.0
PHONELINK PLC	0.33	0.47	0.44	0.40	0.3
RPC GROUP	0.82	0.83	0.83	0.83	0.3
DREW SCIENTIFIC GROUP	0.36	0.21	0.22	0.21	0.2
BREAK FOR THE BORDER	0.11	0.13	0.16	0.16	0.1
DIVISION GROUP	0.80	0.69	0.84	0.77	0.6
BRUNTCLIFFE AGGREGATES	0.04	0.39	0.25	0.28	0.2
STAGECOACH	0.10	0.11	0.09	0.09	0.1
DAVID BROWN GROUP	0.17	0.21	0.21	0.22	0.2
WESTMINSTER HEALTHCARE	0.07	0.09	0.08	0.06	0.0
HOLLIDAY CHEMICALS HOLDINGS	0.06	0.04	0.07	0.06	0.0
QUALITY SOFTWARE PRODUCTS HOLDING	0.31	0.24	0.21	0.24	0.2
HAMBRO INSURANCE SERVICES GROUP	0.49	0.71	0.71	0.71	0.7
ATREUS	0.07	0.00	0.02	0.00	-0.0
DAVID LLOYD LEISURE	0.18	0.16	0.17	0.16	0.1
YORKSHIRE FOOD GROUP	0.20	0.17	0.15	0.10	0.1
MOTOR WOLD GROUP	0.26	0.24	0.23	0.24	0.2
TRIO HOLDINGS	-0.39	-0.30	-0.20	-0.20	-0.2
OIS INTERNATIONAL INSPECTION	0.06	0.11	0.10	0.13	0.2
NATIONAL EXPRESS	0.04	0.09	0.09	0.09	0.1
HUNTERS ARMLEY	0.07	0.06	0.06	0.09	0.1
TADPOLE TECHNOLOGY	0.27	1.09	1.01	0.91	0.9
CRITCHELY GROUP	0.08	0.07	0.07	0.13	0.1
WETHERSPOON (JD)	-0.03	0.00	0.03	0.04	0.0
DORLING KINDERSLEY HOLDINGS	0.23	0.29	0.31	0.36	0.4
LINX PRINTING TECHNOLOGIES	0.10	0.14	0.13	0.13	0.1
VARDON	0.05	0.13	0.09	0.02	0.0

TRINITY HOLDINGS	0.07	0.10	0.13	0.11	0.1
TEPNEL DIAGNOSTICS	0.46	0.37	0.34	0.42	0.3
TAUNTON CIDER	0.10	0.10	0.14	0.12	0.1
QUALITY CARE HOMES	0.10	0.09	0.08	0.08	0.0
MFI	0.02	0.06	0.04	0.00	0.0
ANGLIAN GROUP	-0.03	-0.04	-0.03	0.02	-0.0
BRITISH BIOTECHNOLOGY GROUP	-0.01	-0.04	-0.04	-0.06	-0.0
THE TELEGRAPH	-0.14	-0.09	-0.14	-0.16	-0.1
KENWOOD APPLIANCES	0.05	0.03	0.03	0.02	0.0
COUNTRY CASUALS	0.11	0.10	0.07	0.07	0.0
VEGA GROUP	0.12	0.10	0.10	0.09	0.1
IND. CONTROL. SERV. GROUP	0.30	0.30	0.28	0.34	0.2
GROSVENOR INNS	-0.14	-0.14	-0.14	-0.14	-0.1
HUGHES (TJ)	0.16	0.17	0.16	0.13	0.1
WASTE MANAGEMENT INTERNATONAL	0.04	0.09	0.06	0.06	0.0
BRITISH DATA MAMANGEMENT	-0.11	-0.05	0.00	0.08	0.0
FORTH PORTS	0.10	0.13	0.11	0.16	0.1
AVONSIDE GROUP	-0.04	-0.04	-0.02	-0.05	-0.0
ROSEBYS	0.08	0.10	0.10	0.10	0.1
SEALFIELD RESOURSES	-0.02	-0.03	-0.07	-0.11	-0.1
HARRINGTON KILBRIDE	-0.19	-0.22	-0.22	-0.22	-0.2
BURN STEWART DISTILLERS	0.05	0.05	0.04	0.02	0.0
JIB GROUP	0.01	0.02	-0.02	-0.04	-0.0
FROST GROUP	0.13	0.16	0.18	0.19	0.2
SCOTISH POWER	0.06	0.02	0.02	0.02	0.0
SCOTISH HYDRO ELECTRIC	0.09	0.05	0.05	0.05	0.0
MANCHESTER UNITED	-0.24	-0.26	-0.34	-0.29	-0.2
MIRROR GROUP NEWSPAPERS	-0.01	-0.05	-0.10	-0.10	-0.1
POWERGEN	0.19	0.20	0.14	0.15	0.1
NATIONAL POWER	0.19	0.20	0.15	0.17	0.1
LONDON ELECTRICITY	0.16	0.17	0.16	0.15	0.1
MIDLANDS ELECTRICITY	0.17	0.17	0.15	0.15	0.1
EASTERN ELECTRICITY	0.18	0.16	0.14	0.15	0.1
SOUTH WESTERN ELECTRICITY	0.19	0.19	0.18	0.19	0.1
SOUTHERN ELECTRIC	0.19	0.18	0.16	0.16	0.1
EAST MIDLANDS ELECTRICITY	0.19	0.17	0.18	0.18	0.1
NORWEB	0.20	0.18	0.18	0.19	0.1
SOUTH WALES	0.24	0.24	0.23	0.23	0.2
MANWEB	0.24	0.26	0.26	0.23	0.2
SEEBOARD	0.08	0.10	0.08	0.09	0.0
YORKSHIRE ELECTRICITY	0.13	0.35	0.35	0.35	0.3
NORTHERN ELECTRICITY	0.16	0.17	0.18	0.18	0.1
EIDOS	0.02	0.02	0.02	-0.07	-0.0
BRABANT RESOURSES	-4.61	-4.57	-4.61	-4.61	-4.6
STANDARD PLATFORMS	-0.64	-0.74	-0.75	-0.76	-0.8
SETON HEALTHCARE	0.05	0.07	0.06	0.09	0.0
M & W	0.10	0.08	0.08	0.08	0.0
INTERCARE GROUP	0.53	0.51	0.51	0.51	0.5
INVERGORDON DISTILLERS GROUP	0.00	-0.01	0.01	0.02	0.0
QS HOLDINGS	0.07	0.06	0.06	0.08	0.0
TORDAY AND CARLISLE	0.01	0.01	-0.03	-0.03	-0.0
ABI LEISURE	-0.05	0.00	-0.03	-0.04	-0.0
GOLDSMITHS GROUP	-0.11	-0.11	-0.15	-0.16	-0.1

EUROMONEY PUBLICATIONS	-0.03	-0.03	-0.03	-0.04	-0.0
YORKSHIRE WATER	0.19	0.21	0.21	0.27	0.2
WELSH WATER	0.16	0.20	0.17	0.21	0.2
THAMES WATER	0.14	0.18	0.18	0.22	0.2
SOUTHERN WATER	0.16	0.19	0.17	0.20	0.2
SOUTH WEST WATER	0.18	0.21	0.21	0.27	0.2
SEVERN TRENT	0.12	0.16	0.14	0.17	0.1
NORTHUMBRIAN WATER	0.21	0.21	0.23	0.28	0.2
SAGE GROUP	0.05	0.05	0.07	0.22	0.2
NORTH WEST WATER	0.14	0.18	0.15	0.19	0.2
ANGLAIN WATER	0.18	0.23	0.21	0.24	0.2
WESSEX WATER	0.17	0.23	0.21	0.26	0.2
PROSPECT INDUSTRIES	0.14	0.18	0.10	0.10	0.1
STORM GROUP	0.42	0.36	0.36	0.36	0.3
FIRED EARTH TILES	0.02	0.00	0.00	0.01	0.0
BARIS HOLDINGS	-0.16	-0.16	-0.18	-0.19	-0.1
AIR LONDON INTERNATIONAL	0.10	0.08	0.10	0.10	0.1
WESCOL GROUP	-0.06	-0.06	-0.09	-0.09	-0.0
CIA GROUP	-1.01	-1.03	-0.99	-0.99	-0.9
HAYS	-0.09	-0.09	-0.06	-0.07	-0.0
MILLWALL HOLDINGS	-0.30	-0.20	-0.20	-0.25	-0.2
REG VARDY	0.00	-0.04	-0.09	-0.09	-0.0
PARTRIDGE FINE ARTS	0.05	0.02	-0.04	-0.04	-0.0
ESSEX FURNITURE	-0.07	-0.13	-0.24	-0.17	-0.1
POLAR ELECTRONICS	0.06	0.06	0.06	0.05	0.0
RICHMOND OIL AND GAS	-0.53	-0.53	-0.65	-0.43	-0.4
WESTMINSTER SCAFFOLDING	-0.77	-0.77	-0.77	-0.77	-0.7
ABBEY NATIONAL	0.16	0.13	0.10	0.10	0.1

Statistical Tests for Skewness, Kurtosis and Normality

For the purposes of this part of the study it is necessary to test the distributions to determine whether they exhibit properties which are not symptomatic of a normal distribution.

The results of the tests of skewness, kurtosis and normality are shown below for data in both logged and non-logged forms. The data is tested at each discrete time period. The tests used are as listed below. The Prophet v5 package was used for the analysis.

Normality	Shapiro Wilk Test
Skewness	D'Agostino Test
Kurtosis	Anscombe-Glynn Test
Normailty	D'Agostino Pearson Test

Test Results: Logged Data

Day One Return

Normality test :
Null hypothesis: The population
follows the normal distribution.
Shapiro-Wilk test
Significance level: 0.05
Calculated W = 0.6504
Corresponding P value: **P < 0.0001**
Inference: **Reject** hypothesis
of normality.
Reason: P < 0.05.

D'Agostino skewness test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
skewness (asymmetry).
Significance level: 0.05
Calculated skewness = 2.1143
Expected value for normal distribution = 0.0
Calculated statistic: Z = 3.7253
Corresponding P value: **P = 0.0002**
Inference: **Reject** hypothesis of normality.
Reason: P < 0.05

Anscombe-Glynn kurtosis test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
nonnormal kurtosis (light- or heavy-tailedness).
Significance level: 0.05
Calculated kurtosis = 4.0861
Expected value for normal distribution = 0.0
Calculated statistic: Z = 2.688
Corresponding P value: **P = 0.0072**
Inference: **Reject** hypothesis of normality.
Reason: P < 0.05

D'Agostino-Pearson omnibus normality test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
nonnormal kurtosis (light- or heavy-tailedness) or skewness.
Significance level: 0.05
Calculated skewness = 2.1143
Expected value for normal distribution = 0.0
Calculated kurtosis = 4.0861
Expected value for normal distribution = 0.0
Calculated statistic: K = 21.1036
Corresponding P value for chi-square with
2 degrees of freedom: **P = 0.0001**
Inference: **Reject** hypothesis of normality.
Reason: P < 0.05

Test Results: Logged Data

Week One Return

Normality test :
Null hypothesis: The population
follows the normal distribution.
Shapiro-Wilk test
Significance level: 0.05
Calculated W = 0.7012
Corresponding P value: **P < 0.0001**
Inference: **Reject** hypothesis
of normality.
Reason: P < 0.05.

D'Agostino skewness test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
skewness (asymmetry).
Significance level: 0.05
Calculated skewness = 1.5524
Expected value for normal distribution = 0.0
Calculated statistic: Z = 2.9936
Corresponding P value: **P = 0.0028**
Inference: **Reject** hypothesis of normality.
Reason: P < 0.05

Anscombe-Glynn kurtosis test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
nonnormal kurtosis (light- or heavy-tailedness).
Significance level: 0.05
Calculated kurtosis = 1.2128
Expected value for normal distribution = 0.0
Calculated statistic: Z = 1.3425
Corresponding P value: **P = 0.1794**
Inference: **Fail** to reject hypothesis of normality.
Reason: P > 0.05

D'Agostino-Pearson omnibus normality test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
nonnormal kurtosis (light- or heavy-tailedness) or skewness.
Significance level: 0.05
Calculated skewness = 1.5524
Expected value for normal distribution = 0.0
Calculated kurtosis = 1.2128
Expected value for normal distribution = 0.0
Calculated statistic: K = 10.7642
Corresponding P value for chi-square with
2 degrees of freedom: **P = 0.0046**
Inference: **Reject** hypothesis of normality.
Reason: P < 0.05

Test Results: Logged Data

Week 2 Return

Normality test :
Null hypothesis: The population
follows the normal distribution.
Shapiro-Wilk test
Significance level: 0.05
Calculated W = 0.704
Corresponding P value: **P < 0.0001**
Inference: **Reject** hypothesis
of normality.
Reason: P < 0.05.

D'Agostino skewness test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
skewness (asymmetry).
Significance level: 0.05
Calculated skewness = 1.5599
Expected value for normal distribution = 0.0
Calculated statistic: Z = 3.0045
Corresponding P value: **P = 0.0027**
Inference: **Reject** hypothesis of normality.
Reason: P < 0.05

Anscombe-Glynn kurtosis test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
nonnormal kurtosis (light- or heavy-tailedness).
Significance level: 0.05
Calculated kurtosis = 1.2464
Expected value for normal distribution = 0.0
Calculated statistic: Z = 1.3659
Corresponding P value: **P = 0.1719**
Inference: **Fail** to reject hypothesis of normality.
Reason: P > 0.05

D'Agostino-Pearson omnibus normality test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
nonnormal kurtosis (light- or heavy-tailedness) or skewness.
Significance level: 0.05
Calculated skewness = 1.5599
Expected value for normal distribution = 0.0
Calculated kurtosis = 1.2464
Expected value for normal distribution = 0.0
Calculated statistic: K = 10.8925
Corresponding P value for chi-square with
2 degrees of freedom: **P = 0.0043**
Inference: **Reject** hypothesis of normality.
Reason: P < 0.05

Test Results: Logged Data

Week Three Return

Normality test :
Null hypothesis: The population
follows the normal distribution.
Shapiro-Wilk test
Significance level: 0.05
Calculated W = 0.7549
Corresponding P value: **P < 0.0001**
Inference: **Reject** hypothesis
of normality.
Reason: P < 0.05.

D'Agostino skewness test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
skewness (asymmetry).
Significance level: 0.05
Calculated skewness = 1.4135
Expected value for normal distribution = 0.0
Calculated statistic: Z = 2.7873
Corresponding P value: **P = 0.0053**
Inference: **Reject** hypothesis of normality.
Reason: P < 0.05

Anscombe-Glynn kurtosis test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
nonnormal kurtosis (light- or heavy-tailedness).
Significance level: 0.05
Calculated kurtosis = 0.8644
Expected value for normal distribution = 0.0
Calculated statistic: Z = 1.0815
Corresponding P value: **P = 0.2795**
Inference: **Fail** to reject hypothesis of normality.
Reason: P > 0.05

D'Agostino-Pearson omnibus normality test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
nonnormal kurtosis (light- or heavy-tailedness) or skewness.
Significance level: 0.05
Calculated skewness = 1.4135
Expected value for normal distribution = 0.0
Calculated kurtosis = 0.8644
Expected value for normal distribution = 0.0
Calculated statistic: K = 8.9389
Corresponding P value for chi-square with
2 degrees of freedom: **P = 0.0115**
Inference: **Reject** hypothesis of normality.
Reason: P < 0.05

Test Results: Logged Data

Week Four Return

Normality test :
Null hypothesis: The population
follows the normal distribution.
Shapiro-Wilk test
Significance level: 0.05
Calculated W = 0.7639
Corresponding P value: **P < 0.0001**
Inference: **Reject** hypothesis
of normality.
Reason: P < 0.05.

D'Agostino skewness test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
skewness (asymmetry).
Significance level: 0.05
Calculated skewness = 1.1083
Expected value for normal distribution = 0.0
Calculated statistic: Z = 2.2926
Corresponding P value: **P = 0.0219**
Inference: **Reject** hypothesis of normality.
Reason: P < 0.05

Anscombe-Glynn kurtosis test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
nonnormal kurtosis (light- or heavy-tailedness).
Significance level: 0.05
Calculated kurtosis = -0.3255
Expected value for normal distribution = 0.0
Calculated statistic: Z = 0.5949
Corresponding P value: **P = 0.5519**
Inference: **Fail** to reject hypothesis of normality.
Reason: P > 0.05

D'Agostino-Pearson omnibus normality test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
nonnormal kurtosis (light- or heavy-tailedness) or skewness.
Significance level: 0.05
Calculated skewness = 1.1083
Expected value for normal distribution = 0.0
Calculated kurtosis = -0.3255
Expected value for normal distribution = 0.0
Calculated statistic: K = 5.6098
Corresponding P value for chi-square with
2 degrees of freedom: **P = 0.0605**
Inference: **Fail** to reject hypothesis of normality.
Reason: P > 0.05

Test Results: Non-Logged Data

Day One Return

Normality test :
Null hypothesis: The population follows the normal distribution.
Shapiro-Wilk test
Significance level: 0.05
Calculated W = 0.6173
Corresponding P value: **P < 0.0001**
Inference: **Reject** hypothesis of normality.
Reason: P < 0.05.

D'Agostino skewness test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to skewness (asymmetry).
Significance level: 0.05
Calculated skewness = 2.5122
Expected value for normal distribution = 0.0
Calculated statistic: Z = 4.1622
Corresponding P value: **P = 0.0001**
Inference: **Reject** hypothesis of normality.
Reason: P < 0.05

Anscombe-Glynn kurtosis test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to nonnormal kurtosis (light- or heavy-tailedness).
Significance level: 0.05
Calculated kurtosis = 6.5661
Expected value for normal distribution = 0.0
Calculated statistic: Z = 3.3274
Corresponding P value: **P = 0.0009**
Inference: **Reject** hypothesis of normality.
Reason: P < 0.05

D'Agostino-Pearson omnibus normality test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to nonnormal kurtosis (light- or heavy-tailedness) or skewness.
Significance level: 0.05
Calculated skewness = 2.5122
Expected value for normal distribution = 0.0
Calculated kurtosis = 6.5661
Expected value for normal distribution = 0.0
Calculated statistic: K = 28.3949
Corresponding P value for chi-square with 2 degrees of freedom: **P = 0.0001**
Inference: **Reject** hypothesis of normality.
Reason: P < 0.05

Test Results: Non-Logged Data

Week One Return

Normality test :
Null hypothesis: The population
follows the normal distribution.
Shapiro-Wilk test
Significance level: 0.05
Calculated W = 0.6846
Corresponding P value: **P < 0.0001**
Inference: **Reject** hypothesis
of normality.
Reason: P < 0.05.

D'Agostino skewness test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
skewness (asymmetry).
Significance level: 0.05
Calculated skewness = 1.7787
Expected value for normal distribution = 0.0
Calculated statistic: Z = 3.3067
Corresponding P value: **P = 0.0009**
Inference: **Reject** hypothesis of normality.
Reason: P < 0.05

Anscombe-Glynn kurtosis test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
nonnormal kurtosis (light- or heavy-tailedness).
Significance level: 0.05
Calculated kurtosis = 2.3599
Expected value for normal distribution = 0.0
Calculated statistic: Z = 2.0092
Corresponding P value: **P = 0.0445**
Inference: **Reject** hypothesis of normality.
Reason: P < 0.05

D'Agostino-Pearson omnibus normality test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
nonnormal kurtosis (light- or heavy-tailedness) or skewness.
Significance level: 0.05
Calculated skewness = 1.7787
Expected value for normal distribution = 0.0
Calculated kurtosis = 2.3599
Expected value for normal distribution = 0.0
Calculated statistic: K = 14.9712
Corresponding P value for chi-square with
2 degrees of freedom: **P = 0.0006**
Inference: **Reject** hypothesis of normality.
Reason: P < 0.05

Test Results: Non-Logged Data

Week Two Return

Normality test :
Null hypothesis: The population
follows the normal distribution.
Shapiro-Wilk test
Significance level: 0.05
Calculated W = 0.7096
Corresponding P value: **P < 0.0001**
Inference: **Reject** hypothesis
of normality.
Reason: P < 0.05.

D'Agostino skewness test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
skewness (asymmetry).
Significance level: 0.05
Calculated skewness = 1.5273
Expected value for normal distribution = 0.0
Calculated statistic: Z = 2.9571
Corresponding P value: **P = 0.0031**
Inference: **Reject** hypothesis of normality.
Reason: P < 0.05

Anscombe-Glynn kurtosis test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
nonnormal kurtosis (light- or heavy-tailedness).
Significance level: 0.05
Calculated kurtosis = 1.1536
Expected value for normal distribution = 0.0
Calculated statistic: Z = 1.3006
Corresponding P value: **P = 0.1934**
Inference: **Fail** to reject hypothesis of normality.
Reason: P > 0.05

D'Agostino-Pearson omnibus normality test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
nonnormal kurtosis (light- or heavy-tailedness) or skewness.
Significance level: 0.05
Calculated skewness = 1.5273
Expected value for normal distribution = 0.0
Calculated kurtosis = 1.1536
Expected value for normal distribution = 0.0
Calculated statistic: K = 10.4363
Corresponding P value for chi-square with
2 degrees of freedom: **P = 0.0054**
Inference: **Reject** hypothesis of normality.
Reason: P < 0.05

Test Results: Non-Logged Data

Week Three Return

Normality test :
Null hypothesis: The population
follows the normal distribution.
Shapiro-Wilk test
Significance level: 0.05
Calculated W = 0.7428
Corresponding P value: **P < 0.0001**
Inference: **Reject** hypothesis
of normality.
Reason: P < 0.05.

D'Agostino skewness test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
skewness (asymmetry).
Significance level: 0.05
Calculated skewness = 1.4676
Expected value for normal distribution = 0.0
Calculated statistic: Z = 2.8691
Corresponding P value: **P = 0.0041**
Inference: **Reject** hypothesis of normality.
Reason: P < 0.05

Anscombe-Glynn kurtosis test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
nonnormal kurtosis (light- or heavy-tailedness).
Significance level: 0.05
Calculated kurtosis = 1.0986
Expected value for normal distribution = 0.0
Calculated statistic: Z = 1.2608
Corresponding P value: **P = 0.2074**
Inference: **Fail** to reject hypothesis of normality.
Reason: P > 0.05

D'Agostino-Pearson omnibus normality test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
nonnormal kurtosis (light- or heavy-tailedness) or skewness.
Significance level: 0.05
Calculated skewness = 1.4676
Expected value for normal distribution = 0.0
Calculated kurtosis = 1.0986
Expected value for normal distribution = 0.0
Calculated statistic: K = 9.8214
Corresponding P value for chi-square with
2 degrees of freedom: **P = 0.0074**
Inference: **Reject** hypothesis of normality.
Reason: P < 0.05

Test Results: Non-Logged Data

Week Four Return

Normality test :
Null hypothesis: The population
follows the normal distribution.
Shapiro-Wilk test
Significance level: 0.05
Calculated W = 0.7816
Corresponding P value: **P = 0.0001**
Inference: **Reject** hypothesis
of normality.
Reason: $P < 0.05$.

D'Agostino skewness test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
skewness (asymmetry).
Significance level: 0.05
Calculated skewness = 1.2521
Expected value for normal distribution = 0.0
Calculated statistic: Z = 2.5331
Corresponding P value: **P = 0.0113**
Inference: **Reject** hypothesis of normality.
Reason: $P < 0.05$

Anscombe-Glynn kurtosis test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
nonnormal kurtosis (light- or heavy-tailedness).
Significance level: 0.05
Calculated kurtosis = 0.4385
Expected value for normal distribution = 0.0
Calculated statistic: Z = 0.7071
Corresponding P value: **P = 0.4795**
Inference: **Fail** to reject hypothesis of normality.
Reason: $P > 0.05$

D'Agostino-Pearson omnibus normality test :
Null hypothesis: The population follows the normal distribution.
Alternative hypothesis : The population is nonnormal due to
nonnormal kurtosis (light- or heavy-tailedness) or skewness.
Significance level: 0.05
Calculated skewness = 1.2521
Expected value for normal distribution = 0.0
Calculated kurtosis = 0.4385
Expected value for normal distribution = 0.0
Calculated statistic: K = 6.9166
Corresponding P value for chi-square with
2 degrees of freedom: **P = 0.0315**
Inference: **Reject** hypothesis of normality.
Reason: $P < 0.05$

Data Used in Enumeration Work in Chapter Six

Logged Data Split at Small Cap		Day 1	Week 1	Week 2	Week 3	Week 4
Big	70-75	0	0	0	0	0
	65-70	0	0	0	0	0
	60-65	0	0	0	0	0
	55-60	0	0	0	0	0
	50-55	0	0	0	0	0
	45-50	0	0	0	0	0
	40-45	0	0	0	0	0
	35-40	0	0	0	0	0
	30-35	0	1	0	1	1
	25-30	0	0	0	1	0
	20-25	0	4	2	3	5
	15-20	14	12	9	12	8
	10-15	4	1	6	2	4
	5-10	3	3	3	2	1
	0-5	5	4	5	4	4
	-5 to 0	3	2	2	3	3
	-10 to -5	1	0	3	2	3
	-15 to -10	2	0	1	2	1
	-20 to -15	0	0	0	0	1
	-25 to -20	0	0	0	0	0
	-30 to -25	0	0	0	0	0
	-35 to -30	0	0	0	0	0
	-40 to -35	0	0	0	0	0
	-45 to -40	0	0	0	0	0
		32	27	31	32	31
Small	70-75	2	1	1	1	1
	65-70	1	3	1	2	1
	60-65	0	0	0	0	0
	55-60	0	0	1	0	1
	50-55	2	2	2	1	1
	45-50	2	2	0	0	0
	40-45	2	2	4	5	4
	35-40	3	4	3	4	7
	30-35	6	1	4	4	6
	25-30	6	8	3	7	10
	20-25	8	19	17	17	17
	15-20	18	16	23	21	23
	10-15	29	33	29	29	32
	5-10	49	43	49	48	32
	0-5	77	56	38	44	44
	-5 to 0	22	31	29	27	28
	-10 to -5	11	9	14	16	17
	-15 to -10	4	4	8	12	12
	-20 to -15	3	3	3	6	6
	-25 to -20	1	3	3	2	3
	-30 to -25	1	0	0	0	0
	-35 to -30	0	0	1	1	0
	-40 to -35	1	0	2	1	0
	-45 to -40	0	0	0	1	2

Statistical Backup Pertinent to Chapter Seven

****
WLS Estimation of Primary Regression Model
****

* * * * MULTIPLE REGRESSION * * * *

Listwise Deletion of Missing Data

Weighted Least Squares - Weighted By..FUNDS_RA

	Mean	Std Deviation	Label
LNEXRTN	.129	25.061	
RETD	.151	80.849	
LNGPROC	-12.852	430.277	
LNPTP	10.659	499.018	
NAV	610199.426	220571255.017	
SPONREP	.732	141.965	
SAME_SB	.080	87.113	
AUDREP	.921	86.635	
SAME_AUD	194	126.873	
BIG_STOC	.681	149.382	

N of Cases = 219

* * * * MULTIPLE REGRESSION * * * *

Equation Number 1 Dependent Variable.. LNEXRTN

Block Number 1. Method: Enter
RETD LNGPROC LNPTP NAV SPONREP SAME_SB AUDREP SAME_AUD
BIG_STOC

Variable(s) Entered on Step Number
1.. BIG_STOC
2.. AUDREP
3.. SAME_AUD
4.. SAME_SB
5.. SPONREP
6.. RETD
7.. LNPTP
8.. NAV
9.. LNGPROC

Multiple R	.72745
R Square	.52918
Adjusted R Square	.50891

Standard Error 17.56252

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	9	72456.33825	8050.70425
Residual	209	64464.42652	308.44223

F = 26.10117 Signif F = .0000

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. LNEXRTN

------------------------ Variables in the Equation -------------------------

Variable	B	SE B	T
RETD	-.091309	.023268	-3.924
LNGPROC	.006035	.008712	.693
LNPTP	.012541	.005588	2.244
NAV	2.79755E-08	1.2171E-08	2.299
SPONREP	.062907	.013124	4.793
SAME_SB	-.004805	.016234	-.296
AUDREP	-.022096	.014693	-1.504
SAME_AUD	.002751	.015894	.173
BIG_STOC	-.046818	.014080	-3.325
(Constant)	.075734	.090487	.837

------ in -------

Variable	Sig T
RETD	.0001
LNGPROC	.4893
LNPTP	.0259
NAV	.0225
SPONREP	.0000
SAME_SB	.7675
AUDREP	.1341
SAME_AUD	.8628
BIG_STOC	.0010
(Constant)	.4036

****

Multicollinearity

****

Collinearity Diagnostics

Number	Eigenval	Cond Index	Variance Proportions Constant	RETD	LNGPROC	LNPTP	NAV	SPONREP
1	4.43574	1.000	.00001	.00951	.00467	.00744	.00630	.01109
2	1.20750	1.917	.00018	.02372	.00023	.00241	.03395	.02160
3	1.02837	2.077	.10035	.00855	.00030	.00012	.00006	.01040
4	.99752	2.109	.89126	.00030	.00000	.00007	.00002	.00069
5	.84678	2.289	.00008	.10275	.00001	.00366	.00003	.04872
6	.62665	2.661	.00131	.02976	.00417	.00805	.00413	.11380
7	.46819	3.078	.00046	.35131	.00238	.04026	.03807	.20257
8	.20067	4.702	.00078	.09175	.01047	.26140	.05093	.53538
9	.11347	6.252	.00137	.06812	.00086	.40499	.82358	.04883
10	.07510	7.685	.00420	.31422	.97690	.27159	.04295	.00692

	SAME_SB	AUDREP	SAME_AUD	BIG_STOC
1	.00818	.00088	.00414	.00979
2	.05068	.00125	.15715	.00078
3	.04616	.64747	.00030	.00413
4	.01045	.07569	.00003	.00050
5	.44380	.11709	.00017	.00703
6	.19909	.01881	.02721	.24077
7	.06268	.00436	.06462	.01325
8	.05227	.02434	.08947	.40933
9	.05615	.00480	.64449	.04925
10	.07053	.10531	.01240	.26517

****

Examination of the results indicates that multicollinearity is not a
major problem in the model

****

End Block Number 1 All requested variables entered.

* *

Residuals Statistics:

	Min	Max	Mean	Std Dev	N
*PRED	-.0343	.1983	.0641	.0453	219
*RESID	-.3023	.3642	.0109	.0987	219
*ZPRED	.	.	.	.	0
*ZRESID	.	.	.	.	0

Total Cases = 289

****

Serial Correlation Test

Durbin-Watson Test = 1.83322

The value of the Durbin-Watson test above implies that the null hypothesis of

no serial correlation in the model cannot be rejected.
****

NOTE: No plots will be produced when a WLS weighting variable (/REGWGT in command syntax) is specified. You can SAVE the appropriate variables and use other procedures (e.g. EXAMINE and PLOT) to produce the requested plots. To plot weighted versions of the residuals and predicted values, use COMPUTE before plotting:
COMPUTE RESID = SQRT(REGWGTvar) * RESID
COMPUTE PRED = SQRT(REGWGTvar) * PRED

* * * * MULTIPLE REGRESSION * * * *

Equation Number 1 Dependent Variable.. LNEXRTN

From Equation 1: 2 new variables have been created.

Name	Contents
----	--------
PRE_4	Predicted Value
RES_4	Residual

Number of valid observations (listwise) = 219.00

****
Descriptive Statistics Used in Testing
****
Variable RES_4 Residual

Mean	.011	Std Dev	.099
Kurtosis	2.419	S.E. Kurt	.327
Skewness	.806	S.E. Skew	.164
Minimum	-.30231	Maximum	.36425
Sum	2.378		

Valid observations - 219 Missing observations - 72

\- -

Variable EXRTN

Mean	8.331	Std Dev	15.179
Kurtosis	7.003	S.E. Kurt	.286
Skewness	.805	S.E. Skew	.143
Minimum	-63.20	Maximum	94.79
Sum	2407.521		

Valid observations - 289 Missing observations - 2

****

Results of Breusch Pagan Godfrey Test for Heteroscedasticity

****

The test was conducted in the following manner.

1) Firstly, the residuls from the estimated model were obtained.
2) The sum of the squared residuals was then divided by the number of observations.
3) Variable BPGRES was constructed as the ration of residuals squared to the constant derived in step 2)
4) BPGRES was regressed on the original explanatory variables and the regression sum of squares obtained.
5) Half this value was compared to the Chi-Squared distribution with the appropriate degrees of freedom.

**** M U L T I P L E   R E G R E S S I O N ***

Equation Number 1   Dependent Variable.. BPGRES

Block Number 1. Method: Enter
  RETD   LNGPROC LNPTP   NAV   SPONREP SAME_SB AUDREP REPREP
  BIG_STOC

Variable(s) Entered on Step Number
  1.. BIG_STOC
  2.. REPREP
  3.. SAME_SB
  4.. SPONREP
  5.. NAV
  6.. RETD
  7.. LNPTP
  8.. AUDREP
  9.. LNGPROC

Multiple R	.46597
R Square	.21713
Adjusted R Square	.18342
Standard Error	224.38996

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	9	2918647.40023	324294.15558
Residual	209	10523328.53801	50350.85425

F =   6.44069   Signif F = .0000

Half Regression Sum of Squares = 1459323. Consequently we can reject the null hypothesis of homoscedasticity.
Due to the level of heteroscedasticity found inference from the model as specified will be of low quality.
Consequently, White's heteroscedasticity consistent variances were calculated and the results of tests of significance based on these estimates reported.

Results of Estimation Using MicroFit version 4 package

White Heteroscedasticity Consistent Estiamates for Model Parameters

Ordinary Least Squares Estimation

****

Dependent variable is LNEXRTN

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
RETD	-.027305	.037409	-.72990[.466]
LNGPROC	-.0039985	.010505	-.38063[.704]
LNPTP	-.0041487	.0078108	-.53115[.596]
NAV	.9895E-7	.3774E-7	2.6217[.009]
SPONREP	.033816	.019986	1.6920[.092]
SAME_SB	.012230	.015502	.78893[.431]
AUDREP	-.012430	.017423	-.71346[.476]
SAME_AUD	-.038123	.023227	-1.6413[.102]
BIG_STOC	-.034864	.032223	-1.0820[.281]
CONST	.077626	.091335	.84990[.396]

****

R-Squared	.10022	R-Bar-Squared	.061471
S.E. of Regression	.096459	F-Stat. F(9, 209)	2.5865[.008]
Mean of Dependent Variable	.074943	S.D. of Dependent Variable	.099568
Residual Sum of Squares	1.9446	Equation Log-likelihood	206.5307
Akaike Info. Criterion	196.5307	Schwarz Bayesian Criterion	179.5854
DW-statistic	1.7580		

****

Diagnostic Tests

****

* Test Statistics *	LM version *	F Version
* A:Serial Correlation	CHSQ(1)= 3.4442[.063]*	F(1, 208)= 3.3235[.070]
* B:Functional Form	CHSQ(1)= 1.0026[.317]*	F(1, 208)= .95662[.329]
* C:Normality	CHSQ(2)= 24.0890[.000]*	Not applicable
* D:Heteroscedasticity	CHSQ(1)= 1.4284[.232]*	F(1, 217)= 1.4246[.234]

****

A:Lagrange multiplier test of residual serial correlation

B:Ramsey's RESET test using the square of the fitted values

C:Based on a test of skewness and kurtosis of residuals

D:Based on the regression of squared residuals on squared fitted values

Parameter Estimates Based on White Adjusted Standard Errors

Ordinary Least Squares Estimation
Based on White's Heteroscedasticity adjusted S.E.'s

****

Dependent variable is LNEXRTN

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
RETD	-.027305	.039971	-.68312[.495]
LNGPROC	-.0039985	.013211	-.30266[.762]
LNPTP	-.0041487	.011781	-.35214[.725]
NAV	.9895E-7	.2841E-7	3.4835[.001]
SPONREP	.033816	.015954	2.1196[.035]
SAME_SB	.012230	.015271	.80089[.424]
AUDREP	-.012430	.017923	-.69353[.489]
SAME_AUD	-.038123	.021721	-1.7551[.081]
BIG_STOC	-.034864	.027932	-1.2482[.213]
CONST	.077626	.089001	.87219[.384]

****

****
Analysis of Costs of Flotation
****

* * * * MULTIPLE REGRESSION * * * *

Listwise Deletion of Missing Data

Equation Number 1 Dependent Variable.. COSTS_OF

Block Number 1. Method: Enter FUNDS_RA SPONREP SPECDV

Variable(s) Entered on Step Number
1.. SPECDV
2.. SPONREP
3.. FUNDS_RA

Multiple R .85556
R Square . .73198
Adjusted R Square .72916
Standard Error 1916.19413

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	3	2857926697.77459	952642232.59153
Residual	285	1046462988.68908	3671799.96031

F = 259.44829 Signif F = .0000

------------------ Variables in the Equation ------------------

Variable	B	SE B	Beta	T	Sig T
FUNDS_RA	.034251	.001871	1.999761	18.311	.0000
SPONREP	662.154148	343.668670	.071683	1.927	.0550
SPECDV	-.022711	.001975	-1.311794	-11.497	.0000
(Constant)	351.774589	137.799683		2.553	.0112

From the analysis variable SPECDV (=FUNDS_RA * SPONREP) is highly significant. Dummy variable SPONREP is not strictly significnat but is very nearly. The critical value for the t test is 1.96 at the 5% level versus the recorded value of 1.93.

What is clear is that there are two very different cost functions for the two agent types.

Reputable:
Costs of Float = A + B1FUNDS_RA + B2SPONREP + B3SPECDV
351.77 + 0.03452FUNDS_RA + 662.15SPONREP - 0.0227SPECDV
1013.92 + 0.01182FUNDS_RA
Others
Costs of Float = A + B1FUNDS_RA + B2SPONREP + B3SPECDV

351.77 + 0.03452FUNDS_RA

Therefore, its clearly more expensive to use a reputable sponsor for floats below a certain size. To find that size we solve the two equations above for FUNDS_RA.
Thus..1013.92 + 0.01182FUNDS_RA = 351.77 + 0.03452FUNDS_RA
......0.0227FUNDS-RA = 662.15
......FUNDS_RA = 29169

Therefore, using a an unreputable sponsor starts to become uneconomic when more than about thirty million pounds of funds are being raised.

Chapter Seven - Statistics Supporting Futher Analysis Work.

Regression results including costs of flotation as a variable

Ordinary Least Squares Estimation

****

Dependent variable is LNEXRTN

206 observations used for estimation from 1 to 206

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
RETD	-.059612	.038870	-1.5336[.127]
LNGPROC	-.0025681	.0099828	-.25725[.797]
LNPTP	.5747E-3	.0079859	.071960[.943]
NAV	-.6164E-7	.4199E-7	-1.4680[.144]
SPONREP	-.0010265	.020095	-.051084[.959]
SSB	.0033909	.015038	.22548[.822]
AUDREP	.014244	.018280	.77921[.437]
SAUDREP	-.010453	.025116	-.41619[.678]
BIG_STOCK	-.0043452	.035331	-.12298[.902]
COSTS	.3283E-5	.2788E-5	1.1775[.240]
CONST	.058493	.078313	.74691[.456]

****

R-Squared	.047797	R-Bar-Squared	-.0010338
S.E. of Regression	.099393	F-Stat. F(10, 195)	.97883[.463]
Mean of Dependent Variable	.073621	S.D. of Dependent Variable	.099342
Residual Sum of Squares	1.9264	Equation Log-likelihood	188.9378
Akaike Info. Criterion	177.9378	Schwarz Bayesian Criterion	159.6344
DW-statistic	1.7852		

****

Diagnostic Tests

****

* Test Statistics * LM Version * F Version

****

* * *

* A:Serial Correlation*CHSQ(1)= 2.4897[.115]*F(1, 194)= 2.3734[.125]

*   *   *

* B:Functional Form   *CHSQ(1)=   2.1567[.142]*F(1, 194)=   2.0526[.154]

*   *   *

* C:Normality   *CHSQ(2)= 26.5521[.000]*   Not applicable

*   *   *

* D:Heteroscedasticity*CHSQ(1)=   5.2247[.022]*F(1, 204)=   5.3086[.022]

****

A:Lagrange multiplier test of residual serial correlation

B:Ramsey's RESET test using the square of the fitted values

C:Based on a test of skewness and kurtosis of residuals

D:Based on the regression of squared residuals on squared fitted values

Ordinary Least Squares Estimation

Based on White's Heteroscedasticity adjusted S.E.'s

****

Dependent variable is LNEXRTN

206 observations used for estimation from   1 to 206

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
RETD	-.059612	.042458	-1.4040[.162]
LNGPROC	-.0025681	.014278	-.17986[.857]
LNPTP	.5747E-3	.012421	.046267[.963]
NAV	-.6164E-7	.3899E-7	-1.5809[.116]
SPONREP	-.0010265	.023596	-.043504[.965]
SSB	.0033909	.014938	.22699[.821]
AUDREP	.014244	.020185	.70566[.481]
SAUDREP	-.010453	.020382	-.51284[.609]
BIG_STOCK	-.0043452	.057341	-.075778[.940]
COSTS	.3283E-5	.3299E-5	.99523[.321]
CONST	.058493	.085123	.68716[.493]

****

Regreression Results including Offer Type Dummy Variables

Ordinary Least Squares Estimation

****

Dependent variable is LNEXRTN

206 observations used for estimation from 1 to 206

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
RETD	-.063562	.040781	-1.5586[.121]
LNGPROC	-.0023563	.010189	-.23127[.817]
LNPTP	.9901E-3	.0081080	.12211[.903]
NAV	-.5209E-7	.4487E-7	-1.1609[.247]
SPONREP	.0086607	.022288	.38859[.698]
SSB	-.0027894	.015761	-.17698[.860]
AUDREP	.014846	.018399	.80690[.421]
SAUDREP	-.013053	.025321	-.51551[.607]
BIG_STOCK	.0031595	.036343	.086934[.931]
COSTS	.3567E-5	.2830E-5	1.2604[.209]
CONST	.10556	.12807	.82423[.411]
OFFDY	-.076473	.10641	-.71865[.473]
PLDMY	-.037772	.10096	-.37411[.709]
P_INT	-.047759	.10234	-.46667[.641]
P_OFF	-.060405	.10234	-.59023[.556]

****

R-Squared	.058937	R-Bar-Squared	-.010042
S.E. of Regression	.099839	F-Stat. F(14, 191)	.85442[.609]
Mean of Dependent Variable	.073621	S.D. of Dependent Variable	.099342
Residual Sum of Squares	1.9039	Equation Log-likelihood	190.1498
Akaike Info. Criterion	175.1498	Schwarz Bayesian Criterion	150.1907
DW-statistic	1.7915		

****

Diagnostic Tests

****

* Test Statistics * LM Version * F Version

****

```
*                    *                    *
* A:Serial Correlation*CHSQ(   1)=  2.3958[.122]*F(   1, 190)=  2.2357[.137]
*                    *                    *
* B:Functional Form   *CHSQ(   1)= .051473[.821]*F(   1, 190)= .047487[.828]
*                    *                    *
* C:Normality         *CHSQ(   2)= 23.5277[.000]*     Not applicable
*                    *                    *
* D:Heteroscedasticity*CHSQ(   1)=  3.5386[.060]*F(   1, 204)=  3.5655[.060]
*******************************************************************************
  A:Lagrange multiplier test of residual serial correlation
  B:Ramsey's RESET test using the square of the fitted values
  C:Based on a test of skewness and kurtosis of residuals
  D:Based on the regression of squared residuals on squared fitted values
```

Regression Results on Sub Sample of data - 1989-1990

Ordinary Least Squares Estimation

****

Dependent variable is LNEXRTN

46 observations used for estimation from 1 to 46

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
RETD	-.22936	.099861	-2.2968[.028]
LNGPROC	.019567	.027592	.70917[.483]
LNPTP	.029838	.020533	1.4532[.155]
NAV	.5666E-7	.6714E-7	.84395[.404]
SPONREP	-.051666	.033728	-1.5319[.134]
SSB	-.0060559	.031723	-.19090[.850]
AUDREP	.017314	.029706	.58284[.564]
SAUDREP	.0037512	.061098	.061397[.951]
BIG_STOCK	-.062156	.040582	-1.5316[.134]
CONST	.12016	.19679	.61059[.545]

****

R-Squared	.62628	R-Bar-Squared	.53285
S.E. of Regression	.077572	F-Stat. F(9, 36)	6.7032[.000]
Mean of Dependent Variable	.079637	S.D. of Dependent Variable	.11350
Residual Sum of Squares	.21663	Equation Log-likelihood	57.9677
Akaike Info. Criterion	47.9677	Schwarz Bayesian Criterion	38.8245
DW-statistic	2.1326		

****

Diagnostic Tests

****

* Test Statistics * LM Version * F Version

****

* * *

* A:Serial Correlation*CHSQ(1)= .34867[.555]*F(1, 35)= .26732[.608]

* * *

* B:Functional Form *CHSQ(1)= 7.5038[.006]*F(1, 35)= 6.8223[.013]

* * *

* C:Normality *CHSQ(2)= .73969[.691]* Not applicable

* * *

* D:Heteroscedasticity*CHSQ(1)= 4.6414[.031]*F(1, 44)= 4.9378[.031]

****

A:Lagrange multiplier test of residual serial correlation

B:Ramsey's RESET test using the square of the fitted values

C:Based on a test of skewness and kurtosis of residuals

D:Based on the regression of squared residuals on squared fitted values

Ordinary Least Squares Estimation

Based on White's Heteroscedasticity adjusted S.E.'s

****

Dependent variable is LNEXRTN

46 observations used for estimation from 1 to 46

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
RETD	-.22936	.087740	-2.6141[.013]
LNGPROC	.019567	.024431	.80091[.428]
LNPTP	.029838	.019469	1.5326[.134]
NAV	.5666E-7	.6269E-7	.90384[.372]
SPONREP	-.051666	.030886	-1.6728[.103]
SSB	-.0060559	.029377	-.20615[.838]
AUDREP	.017314	.038716	.44720[.657]
SAUDREP	.0037512	.029040	.12917[.898]
BIG_STOCK	-.062156	.045512	-1.3657[.181]
CONST	.12016	.17106	.70246[.487]

****

Regression Results on Sub Sample of data - 1989-1990 (Adding Cost Variable)

Ordinary Least Squares Estimation

****

Dependent variable is LNEXRTN

46 observations used for estimation from 1 to 46

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
RETD	-.23792	.099519	-2.3907[.022]
LNGPROC	.018729	.027435	.68267[.499]
LNPTP	.026291	.020623	1.2748[.211]
NAV	-.4693E-8	.8411E-7	-.055797[.956]
SPONREP	-.066321	.035686	-1.8584[.072]
SSB	.0022732	.032290	.070401[.944]
AUDREP	.0097005	.030204	.32117[.750]
SAUDREP	.0055801	.060751	.091853[.927]
BIG_STOCK	-.076607	.042103	-1.8195[.077]
COSTS	.1100E-4	.9180E-5	1.1983[.239]
CONST	.13913	.19625	.70894[.483]

****

R-Squared	.64101	R-Bar-Squared	.53844
S.E. of Regression	.077107	F-Stat. F(10, 35)	6.2495[.000]
Mean of Dependent Variable	.079637	S.D. of Dependent Variable	.11350
Residual Sum of Squares	.20809	Equation Log-likelihood	58.8924
Akaike Info. Criterion	47.8924	Schwarz Bayesian Criterion	37.8348
DW-statistic	2.1675		

****

Diagnostic Tests

****

* Test Statistics * LM Version * F Version

****

* * *

* A:Serial Correlation*CHSQ(1)= .47924[.489]*F(1, 34)= .35795[.554]

* * *

* B:Functional Form *CHSQ(1)= 6.7142[.010]*F(1, 34)= 5.8109[.021]

* * *

* C:Normality *CHSQ(2)= .35557[.837]* Not applicable

* * *

* D:Heteroscedasticity*CHSQ(1)= 4.9205[.027]*F(1, 44)= 5.2703[.027]

****

A:Lagrange multiplier test of residual serial correlation

B:Ramsey's RESET test using the square of the fitted values

C:Based on a test of skewness and kurtosis of residuals

D:Based on the regression of squared residuals on squared fitted values

Ordinary Least Squares Estimation

Based on White's Heteroscedasticity adjusted S.E.'s

****

Dependent variable is LNEXRTN

46 observations used for estimation from 1 to 46

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
RETD	-.23792	.089239	-2.6661[.012]
LNGPROC	.018729	.024482	.76502[.449]
LNPTP	.026291	.017687	1.4865[.146]
NAV	-.4693E-8	.7697E-7	-.060976[.952]
SPONREP	-.066321	.033635	-1.9718[.057]
SSB	.0022732	.029535	.076967[.939]
AUDREP	.0097005	.039856	.24339[.809]
SAUDREP	.0055801	.029886	.18671[.853]
BIG_STOCK	-.076607	.045725	-1.6754[.103]
COSTS	.1100E-4	.7920E-5	1.3890[.174]
CONST	.13913	.17419	.79872[.430]

****

Regression Results on Sub Sample of data - 1991-1992

Ordinary Least Squares Estimation

****

Dependent variable is LNEXRTN

33 observations used for estimation from 1 to 33

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
RETD	.017636	.11499	.15337[.879]
LNGPROC	.0037779	.028286	.13356[.895]
LNPTP	-.043190	.018416	-2.3452[.028]
NAV	-.9034E-7	.7676E-7	-1.1770[.251]
SPONREP	.049233	.067620	.72808[.474]
SSB	.016164	.049058	.32948[.745]
AUDREP	.046654	.054505	.85596[.401]
SAUDREP	-.024503	.11495	-.21316[.833]
BIG_STOCK	.081738	.066202	1.2347[.229]
CONST	.43525	.24048	1.8100[.083]

****

R-Squared	.44137	R-Bar-Squared	.22278
S.E. of Regression	.10873	F-Stat. F(9, 23)	2.0191[.084]
Mean of Dependent Variable	.11145	S.D. of Dependent Variable	.12333
Residual Sum of Squares	.27190	Equation Log-likelihood	32.3555
Akaike Info. Criterion	22.3555	Schwarz Bayesian Criterion	14.8729
DW-statistic	2.4428		

****

Diagnostic Tests

****

* Test Statistics * LM Version * F Version

****

* * *

* A:Serial Correlation*CHSQ(1)= 4.6429[.031]*F(1, 22)= 3.6020[.071]

* * *

* B:Functional Form *CHSQ(1)= .49538[.482]*F(1, 22)= .33528[.568]

* * *

* C:Normality *CHSQ(2)= .20065[.905]* Not applicable

* * *

* D:Heteroscedasticity*CHSQ(1)= .54695[.460]*F(1, 31)= .52246[.475]

****

A:Lagrange multiplier test of residual serial correlation

B:Ramsey's RESET test using the square of the fitted values

C:Based on a test of skewness and kurtosis of residuals

D:Based on the regression of squared residuals on squared fitted values

Ordinary Least Squares Estimation

Based on White's Heteroscedasticity adjusted S.E.'s

****

Dependent variable is LNEXRTN

33 observations used for estimation from 1 to 33

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
RETD	.017636	.12265	.14378[.887]
LNGPROC	.0037779	.023990	.15748[.876]
LNPTP	-.043190	.016287	-2.6518[.014]
NAV	-.9034E-7	.8061E-7	-1.1206[.274]
SPONREP	.049233	.046415	1.0607[.300]
SSB	.016164	.038721	.41744[.680]
AUDREP	.046654	.054277	.85956[.399]
SAUDREP	-.024503	.11355	-.21579[.831]
BIG_STOCK	.081738	.051744	1.5796[.128]
CONST	.43525	.21867	1.9904[.059]

****

Regression Results on Sub Sample of data - 1991-1992 (Adding Cost Variable)

Ordinary Least Squares Estimation

****

Dependent variable is LNEXRTN

33 observations used for estimation from 1 to 33

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
RETD	-.046241	.12077	-.38290[.705]
LNGPROC	.0031977	.027645	.11567[.909]
LNPTP	-.047391	.018231	-2.5995[.016]
NAV	-.1350E-6	.8113E-7	-1.6637[.110]
SPONREP	.059827	.066486	.89984[.378]
SSB	.016268	.047941	.33934[.738]
AUDREP	.049147	.053292	.92223[.366]
SAUDREP	-.0057933	.11308	-.051232[.960]
BIG_STOCK	-.074767	.12624	-.59228[.560]
COSTS	.8701E-5	.6027E-5	1.4438[.163]
CONST	.48180	.23720	2.0312[.054]

****

R-Squared	.48972	R-Bar-Squared	.25778
S.E. of Regression	. 10625	F-Stat. F(10, 22)	2.1114[.069]
Mean of Dependent Variable	.11145	S.D. of Dependent Variable	.12333
Residual Sum of Squares	.24837	Equation Log-likelihood	33.8492
Akaike Info. Criterion	22.8492	Schwarz Bayesian Criterion	14.6184
DW-statistic	2.2821		

****

Diagnostic Tests

****

* Test Statistics * LM Version * F Version

****

* * *

* A:Serial Correlation*CHSQ(1)= 3.1613[.075]*F(1, 21)= 2.2249[.151]

* * *

* B:Functional Form *CHSQ(1)= .026764[.870]*F(1, 21)= .017046[.897]

* * *

* C:Normality *CHSQ(2)= .39799[.820]* Not applicable

* * *

* D:Heteroscedasticity*CHSQ(1)= .38376[.536]*F(1, 31)= .36474[.550]

****

A:Lagrange multiplier test of residual serial correlation

B:Ramsey's RESET test using the square of the fitted values

C:Based on a test of skewness and kurtosis of residuals

D:Based on the regression of squared residuals on squared fitted values

Ordinary Least Squares Estimation

Based on White's Heteroscedasticity adjusted S.E.'s

****

Dependent variable is LNEXRTN

33 observations used for estimation from 1 to 33

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
RETD	-.046241	.14569	-.31738[.754]
LNGPROC	.0031977	.024899	.12842[.899]
LNPTP	-.047391	.016295	-2.9082[.008]
NAV	-.1350E-6	.8427E-7	-1.6016[.124]
SPONREP	.059827	.043926	1.3620[.187]
SSB	.016268	.037248	.43676[.667]
AUDREP	.049147	.055539	.88490[.386]
SAUDREP	-.0057933	.094322	-.061420[.952]
BIG_STOCK	-.074767	.10056	-.74349[.465]
COSTS	.8701E-5	.3822E-5	2.2767[.033]
CONST	.48180	.23829	2.0219[.056]

****

Regression Results on Sub Sample of data - 1993-1995

Ordinary Least Squares Estimation

****

Dependent variable is LNEXRTN

127 observations used for estimation from 1 to 127

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
RETD	.056441	.044614	1.2651[.208]
LNGPROC	.021226	.010694	1.9849[.049]
LNPTP	.0042083	.0092633	.45430[.650]
NAV	-.1821E-6	.1553E-6	-1.1725[.243]
SPONREP	-.013950	.024695	-.56489[.573]
SSB	-.0058828	.014971	-.39295[.695]
AUDREP	.0062186	.020807	.29888[.766]
SAUDREP	-.0067331	.023649	-.28471[.776]
BIG_STOCK	.046736	.068994	.67738[.499]
CONST	.20952	.082610	2.5362[.013]

****

R-Squared	.10971	R-Bar-Squared	.041225
S.E. of Regression	.082271	F-Stat. F(9, 117)	1.6020[.122]
Mean of Dependent Variable	.061613	S.D. of Dependent Variable	.084022
Residual Sum of Squares	.79192	Equation Log-likelihood	142.2145
Akaike Info. Criterion	132.2145	Schwarz Bayesian Criterion	117.9936
DW-statistic	1.7995		

****

Diagnostic Tests

****

* Test Statistics * LM Version * F Version

****

* * *

* A:Serial Correlation*CHSQ(1)= 1.2237[.269]*F(1, 116)= 1.1286[.290]

* * *

* B:Functional Form *CHSQ(1)= 5.7223[.017]*F(1, 116)= 5.4733[.021]

* * *

* C:Normality *CHSQ(2)= 47.6062[.000]* Not applicable

* * *

* D:Heteroscedasticity*CHSQ(1)= 2.8737[.090]*F(1, 125)= 2.8939[.091]

****

A:Lagrange multiplier test of residual serial correlation

B:Ramsey's RESET test using the square of the fitted values

C:Based on a test of skewness and kurtosis of residuals

D:Based on the regression of squared residuals on squared fitted values

Ordinary Least Squares Estimation

Based on White's Heteroscedasticity adjusted S.E.'s

****

Dependent variable is LNEXRTN

127 observations used for estimation from 1 to 127

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
RETD	.056441	.042826	1.3179[.190]
LNGPROC	.021226	.013736	1.5453[.125]
LNPTP	.0042083	.012078	.34843[.728]
NAV	-.1821E-6	.2006E-6	-.90761[.366]
SPONREP	-.013950	.029572	-.47173[.638]
SSB	-.0058828	.015003	-.39212[.696]
AUDREP	.0062186	.014919	.41683[.678]
SAUDREP	-.0067331	.019849	-.33921[.735]
BIG_STOCK	.046736	.12552	.37233[.710]
CONST	.20952	.086160	2.4317[.017]

****

Regression Results on Sub Sample of data - 1993-1995 (Adding Cost Variable)

Ordinary Least Squares Estimation

****

Dependent variable is LNEXRTN

127 observations used for estimation from 1 to 127

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
RETD	.056999	.044333	1.2857[.201]
LNGPROC	.019428	.010687	1.8179[.072]
LNPTP	.0033590	.0092203	.36430[.716]
NAV	-.5383E-7	.1744E-6	-.30875[.758]
SPONREP	-.0086430	.024767	-.34896[.728]
SSB	-.012340	.015427	-.79989[.425]
AUDREP	.010839	.020880	.51908[.605]
SAUDREP	.3892E-3	.023927	.016266[.987]
BIG_STOCK	.081213	.071944	1.1288[.261]
COSTS	-.1042E-4	.6595E-5	-1.5804[.117]
CONST	.20589	.082119	2.5072[.014]

****

R-Squared	.12847	R-Bar-Squared	.053343
S.E. of Regression	.081750	F-Stat. F(10, 116)	1.7100[.086]
Mean of Dependent Variable	.061613	S.D. of Dependent Variable	.084022
Residual Sum of Squares	.77523	Equation Log-likelihood	143.5673
Akaike Info. Criterion	132.5673	Schwarz Bayesian Criterion	116.9243
DW-statistic	1.7554		

****

Diagnostic Tests

****

* Test Statistics * LM Version * F Version

****

* * *

* A:Serial Correlation*CHSQ(1)= 1.8099[.179]*F(1, 115)= 1.6626[.200]

* * *

* B:Functional Form *CHSQ(1)= 5.2605[.022]*F(1, 115)= 4.9693[.028]

*   *   *

* C:Normality   *CHSQ(2)= 58.4483[.000]*   Not applicable

*   *   *

* D:Heteroscedasticity*CHSQ(1)= .54269[.461]*F(1, 125)= .53644[.465]

****

A:Lagrange multiplier test of residual serial correlation

B:Ramsey's RESET test using the square of the fitted values

C:Based on a test of skewness and kurtosis of residuals

D:Based on the regression of squared residuals on squared fitted values

Ordinary Least Squares Estimation

Based on White's Heteroscedasticity adjusted S.E.'s

****

Dependent variable is LNEXRTN

127 observations used for estimation from   1 to 127

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
RETD	.056999	.042595	1.3382[.183]
LNGPROC	.019428	.013438	1.4458[.151]
LNPTP	.0033590	.011865	.28310[.778]
NAV	-.5383E-7	.1531E-6	-.35158[.726]
SPONREP	-.0086430	.029852	-.28953[.773]
SSB	-.012340	.015406	-.80099[.425]
AUDREP	.010839	.015192	.71342[.477]
SAUDREP	.3892E-3	.019375	.020088[.984]
BIG_STOCK	.081213	.11245	.72219[.472]
COSTS	-.1042E-4	.7893E-5	-1.3206[.189]
CONST	.20589	.084014	2.4507[.016]

****

Regression results as Discussed in Chapter Eight

Ordinary Least Squares Estimation

****

Dependent variable is ADJ1

175 observations used for estimation from 1 to 175

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
BIG	-.031293	.12987	-.24096[.810]
MBO	-.046261	.025673	-1.8019[.073]
PBV	.3152E-3	.2454E-3	1.2843[.201]
PSAL	.4768E-4	.6059E-3	.078692[.937]
TURNOVER	.7582E-7	.2188E-6	.34651[.729]
NAV	-.2537E-6	.2512E-6	-1.0096[.314]
PRE	.1668E-5	.1863E-5	.89560[.372]
FUNDS	-.1253E-6	.4115E-6	-.30459[.761]
RETAINED	.10893	.069959	1.5570[.121]
CONST	.031802	.043966	.72334[.470]

****

R-Squared	.074531	R-Bar-Squared	.024051
S.E. of Regression	.15056	F-Stat. F(9, 165)	1.4764[.160]
Mean of Dependent Variable	.078854	S.D. of Dependent Variable	.15241
Residual Sum of Squares	3.7404	Equation Log-likelihood	88.1746
Akaike Info. Criterion	78.1746	Schwarz Bayesian Criterion	62.3507
DW-statistic	2.1039		

****

Diagnostic Tests

****

* Test Statistics * LM Version * F Version

****

* * *

* A:Serial Correlation*CHSQ(1)= .70318[.402]*F(1, 164)= .66164[.417]

* * *

* B:Functional Form *CHSQ(1)= .62452[.429]*F(1, 164)= .58736[.445]

*   *   *

* C:Normality   *CHSQ(2)= 609.9504[.000]*   Not applicable

*   *   *

* D:Heteroscedasticity*CHSQ(1)= 8.3473[.004]*F(1, 173)= 8.6652[.004]

****

A:Lagrange multiplier test of residual serial correlation

B:Ramsey's RESET test using the square of the fitted values

C:Based on a test of skewness and kurtosis of residuals

D:Based on the regression of squared residuals on squared fitted values

Ordinary Least Squares Estimation

Based on White's Heteroscedasticity adjusted S.E.'s

****

Dependent variable is ADJ1

175 observations used for estimation from   1 to 175

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
BIG	-.031293	.090561	-.34555[.730]
MBO	-.046261	.023139	-1.9992[.047]
PBV	.3152E-3	.3663E-3	.86055[.391]
PSAL	.4768E-4	.8924E-3	.053426[.957]
TURNOVER	.7582E-7	.1384E-6	.54767[.585]
NAV	-.2537E-6	.1067E-6	-2.3776[.019]
PRE	.1668E-5	.1515E-5	1.1016[.272]
FUNDS	-.1253E-6	.3932E-6	-.31871[.750]
RETAINED	.10893	.065798	1.6555[.100]
CONST	.031802	.034360	.92557[.356]

****

Ordinary Least Squares Estimation

****

Dependent variable is ADJ5

175 observations used for estimation from 1 to 175

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
BIG	-.089826	.12177	-.73766[.462]
MBO	-.051795	.024073	-2.1516[.033]
PBV	.4912E-3	.2301E-3	2.1346[.034]
PSAL	.4864E-3	.5681E-3	.85621[.393]
TURNOVER	.8855E-7	.2052E-6	.43162[.667]
NAV	-.2177E-6	.2356E-6	-.92411[.357]
PRE	.1560E-5	.1747E-5	.89321[.373]
FUNDS	.3393E-7	.3858E-6	.087942[.930]
RETAINED	.12878	.065599	1.9631[.051]
CONST	.019610	.041226	.47567[.635]

****

R-Squared	.11418	R-Bar-Squared	.065859
S.E. of Regression	.14118	F-Stat. F(9, 165)	2.3630[.015]
Mean of Dependent Variable	.085453	S.D. of Dependent Variable	.14607
Residual Sum of Squares	3.2887	Equation Log-likelihood	99.4365
Akaike Info. Criterion	89.4365	Schwarz Bayesian Criterion	73.6126
DW-statistic	1.9710		

****

Diagnostic Tests

****

* Test Statistics * LM Version * F Version

****

* * *

* A:Serial Correlation*CHSQ(1)= .010521[.918]*F(1, 164)= .0098605[.921]

* * *

* B:Functional Form *CHSQ(1)= .085512[.770]*F(1, 164)= .080176[.777]

* * *

* C:Normality *CHSQ(2)= 316.5164[.000]* Not applicable

* * *

* D:Heteroscedasticity*CHSQ(1)= 5.1857[.023]*F(1, 173)= 5.2830[.023]

****

A:Lagrange multiplier test of residual serial correlation

B:Ramsey's RESET test using the square of the fitted values

C:Based on a test of skewness and kurtosis of residuals

D:Based on the regression of squared residuals on squared fitted values

Ordinary Least Squares Estimation

Based on White's Heteroscedasticity adjusted S.E.'s

****

Dependent variable is ADJ5

175 observations used for estimation from 1 to 175

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
BIG	-.089826	.086436	-1.0392[.300]
MBO	-.051795	.022075	-2.3463[.020]
PBV	.4912E-3	.2719E-3	1.8068[.073]
PSAL	.4864E-3	.9017E-3	.53944[.590]
TURNOVER	.8855E-7	.1322E-6	.67006[.504]
NAV	-.2177E-6	.1148E-6	-1.8964[.060]
PRE	.1560E-5	.1282E-5	1.2171[.225]
FUNDS	.3393E-7	.3037E-6	.11171[.911]
RETAINED	.12878	.056569	2.2765[.024]
CONST	.019610	.029741	.65935[.511]

****

Ordinary Least Squares Estimation

****

Dependent variable is ADJ10

175 observations used for estimation from 1 to 175

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
BIG	-.14512	.12827	-1.1314[.260]
MBO	-.038324	.025358	-1.5113[.133]
PBV	.5109E-3	.2424E-3	2.1073[.037]
PSAL	.6111E-3	.5984E-3	1.0212[.309]
TURNOVER	.6537E-7	.2161E-6	.30246[.763]
NAV	-.1147E-6	.2482E-6	-.46240[.644]
PRE	.2017E-5	.1840E-5	1.0960[.275]
FUNDS	.7066E-7	.4064E-6	.17385[.862]
RETAINED	.11892	.069101	1.7210[.087]
CONST	.012521	.043426	.28832[.773]

****

R-Squared	.094746	R-Bar-Squared	.045369
S.E. of Regression	.14872	F-Stat. F(9, 165)	1.9188[.052]
Mean of Dependent Variable	.080478	S.D. of Dependent Variable	.15221
Residual Sum of Squares	3.6492	Equation Log-likelihood	90.3355
Akaike Info. Criterion	80.3355	Schwarz Bayesian Criterion	64.5116
DW-statistic	1.8908		

****

Diagnostic Tests

****

* Test Statistics * LM Version * F Version

****

Test Statistics	LM Version	F Version
A:Serial Correlation	CHSQ(1)= .46476[.495]	F(1, 164)= .43671[.510]
B:Functional Form	CHSQ(1)= .028715[.865]	F(1, 164)= .026914[.870]
C:Normality	CHSQ(2)= 210.4736[.000]	Not applicable

* D:Heteroscedasticity*CHSQ(1)= 5.1448[.023]*F(1, 173)= 5.2400[.023]

****

A:Lagrange multiplier test of residual serial correlation

B:Ramsey's RESET test using the square of the fitted values

C:Based on a test of skewness and kurtosis of residuals

D:Based on the regression of squared residuals on squared fitted values

Ordinary Least Squares Estimation

Based on White's Heteroscedasticity adjusted S.E.'s

****

Dependent variable is ADJ10

175 observations used for estimation from 1 to 175

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
BIG	-.14512	.096764	-1.4997[.136]
MBO	-.038324	.024025	-1.5952[.113]
PBV	.5109E-3	.2636E-3	1.9384[.054]
PSAL	.6111E-3	.0011624	.52574[.600]
TURNOVER	.6537E-7	.1286E-6	.50845[.612]
NAV	-.1147E-6	.1302E-6	-.88126[.379]
PRE	.2017E-5	.1556E-5	1.2964[.197]
FUNDS	.7066E-7	.3378E-6	.20915[.835]
RETAINED	.11892	.061727	1.9266[.056]
CONST	.012521	.032487	.38540[.700]

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Ordinary Least Squares Estimation

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Dependent variable is ADJ15

175 observations used for estimation from 1 to 175

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
BIG	-.12889	.12345	-1.0441[.298]
MBO	-.033754	.024405	-1.3831[.169]
PBV	.4524E-3	.2333E-3	1.9389[.054]
PSAL	.2377E-3	.5759E-3	.41280[.680]
TURNOVER	.8453E-7	.2080E-6	.40640[.685]
NAV	-.1065E-6	.2388E-6	-.44583[.656]
PRE	.1637E-5	.1771E-5	.92439[.357]
FUNDS	.118E-6	.3911E-6	.28586[.775]
RETAINED	.099429	.066504	1.4951[.137]
CONST	.023249	.041794	.55628[.579]

****

R-Squared	.069900	R-Bar-Squared	.019168
S.E. of Regression	.14313	F-Stat. F(9, 165)	1.3778[.202]
Mean of Dependent Variable	.080461	S.D. of Dependent Variable	.14452
Residual Sum of Squares	3.3801	Equation Log-likelihood	97.0390
Akaike Info. Criterion	87.0390	Schwarz Bayesian Criterion	71.2151
DW-statistic	1.9151		

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Diagnostic Tests

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* Test Statistics * LM Version * F Version

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* * *

* A:Serial Correlation*CHSQ(1)= .27007[.603]*F(1, 164)= .25349[.615]

* * *

* B:Functional Form *CHSQ(1)= .75980[.383]*F(1, 164)= .71515[.399]

* * *

* C:Normality *CHSQ(2)= 209.9971[.000]* Not applicable

* * *

* D:Heteroscedasticity*CHSQ(1)= 1.2992[.254]*F(1, 173)= 1.2939[.257]

****

A:Lagrange multiplier test of residual serial correlation

B:Ramsey's RESET test using the square of the fitted values

C:Based on a test of skewness and kurtosis of residuals

D:Based on the regression of squared residuals on squared fitted values

Ordinary Least Squares Estimation

Based on White's Heteroscedasticity adjusted S.E.'s

****

Dependent variable is ADJ15

175 observations used for estimation from 1 to 175

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
BIG	-.12889	.092285	-1.3967[.164]
MBO	-.033754	.024198	-1.3949[.165]
PBV	.4524E-3	.2251E-3	2.0092[.046]
PSAL	.2377E-3	.8792E-3	.27042[.787]
TURNOVER	.8453E-7	.1326E-6	.63736[.525]
NAV	-.1065E-6	.1180E-6	-.90216[.368]
PRE	.1637E-5	.1412E-5	1.1593[.248]
FUNDS	.1118E-6	.3298E-6	.33905[.735]
RETAINED	.099429	.061058	1.6284[.105]
CONST	.023249	.033188	.70053[.485]

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Ordinary Least Squares Estimation

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Dependent variable is ADJ20

175 observations used for estimation from 1 to 175

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
BIG	-.16782	.13233	-1.2682[.207]
MBO	-.033369	.026159	-1.2756[.204]
PBV	.5951E-3	.2501E-3	2.3796[.018]
PSAL	-.7680E-4	.6173E-3	-.12440[.901]
TURNOVER	.8269E-7	.2229E-6	.37088[.711]
NAV	-.6680E-7	.2560E-6	-.26094[.794]
PRE	.1964E-5	.1898E-5	1.0345[.302]
FUNDS	.9900E-7	.4193E-6	.23612[.814]
RETAINED	.10266	.071285	1.4402[.152]
CONST	.024659	.044799	.55044[.583]

****

R-Squared	.081125	R-Bar-Squared	.031005
S.E. of Regression	.15342	F-Stat. F(9, 165)	1.6186[.114]
Mean of Dependent Variable	.083439	S.D. of Dependent Variable	.15585
Residual Sum of Squares	3.8835	Equation Log-likelihood	84.8900
Akaike Info. Criterion	74.8900	Schwarz Bayesian Criterion	59.0661
DW-statistic	1.9708		

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Diagnostic Tests

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Test Statistics	LM Version	F Version
A:Serial Correlation	CHSQ(1)= .013358[.908]	F(1, 164)= .012520[.911]
B:Functional Form	CHSQ(1)= .59780[.439]	F(1, 164)= .56214[.454]
C:Normality	CHSQ(2)= 165.9943[.000]	Not applicable

* D:Heteroscedasticity*CHSQ(1)= .28006[.597]*F(1, 173)= .27731[.599]

****

A:Lagrange multiplier test of residual serial correlation

B:Ramsey's RESET test using the square of the fitted values

C:Based on a test of skewness and kurtosis of residuals

D:Based on the regression of squared residuals on squared fitted values

Ordinary Least Squares Estimation

Based on White's Heteroscedasticity adjusted S.E.'s

****

Dependent variable is ADJ20

175 observations used for estimation from 1 to 175

****

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
BIG	-.16782	.089526	-1.8745[.063]
MBO	-.033369	.025149	-1.3268[.186]
PBV	.5951E-3	.1909E-3	3.1174[.002]
PSAL	-.7680E-4	.0010727	-.071592[.943]
TURNOVER	.8269E-7	.1461E-6	.56584[.572]
NAV	-.6680E-7	.1330E-6	-.50210[.616]
PRE	.1964E-5	.1358E-5	1.4458[.150]
FUNDS	.9900E-7	.3379E-6	.29301[.770]
RETAINED	.10266	.065777	1.5608[.120]
CONST	.024659	.036022	.68456[.495]

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